Breastfeeding self-efficacy and the duration of exclusive breastfeeding in HIV-infected and uninfected mothers.

by
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DECLARATION

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ABSTRACT

Background: Breastfeeding self-efficacy, measured using the Breastfeeding Self-Efficacy Scale Short-Form (BSES-SF), is a modifiable risk factor for breastfeeding outcomes. The BSES-SF is a valid and reliable tool used to predict a decrease in exclusivity and duration of breastfeeding in a diverse population of mothers.

Objectives: To determine if a relationship exists between breastfeeding self-efficacy (determined using the sum of the BSES-SF scores) and the duration of exclusive of breastfeeding in HIV-infected and HIV-uninfected mothers. In addition to this the difference in exclusive breastfeeding between HIV-infected and HIV-uninfected will be assessed together with additional factors that could affect a mother's breastfeeding self-efficacy and thus BSES-SF scores.

Participants and methods: A descriptive analytical cohort study was conducted, with the primary outcome being the duration of exclusive breastfeeding up to six months postpartum. The study sample comprised 329 women who had given birth at the Rahima Moosa Mother and Child Hospital in Coronationville, during the period August 2014 to May 2015 who were interviewed during their hospital stay using self-formulated questionnaires including the BSES-SF. Post hospital follow-up was done telephonically.

Results: The BSES-SF scores were a positive predictor of the duration of exclusive breastfeeding in both HIV-infected and uninfected mothers. The BSES-SF scores were found to be an independent predictor of an increased duration of exclusive breastfeeding. Other independent predictors of breastfeeding included method of feeding in hospital, prenatal intention to breastfeed and race.

Conclusion: The BSES-SF has been confirmed by our study as a valuable instrument for identifying women at risk of early cessation of exclusive breastfeeding. Together with other demographic, medical and breastfeeding factors, this instrument could be useful to directing limited resources to those most in need of breastfeeding support.

OPSOMMING

Agtergrond: Borsvoeding selfvertroue, gemeet met behulp van die “Breastfeeding Self-Efficacy Scale Short-Form” (BSES-SF), is ‘n veranderbare risikofaktor vir borsvoeding uitkomste. Die BSES-SF is ‘n geldige en betroubare instrument wat aangewend word om ‘n afname in die eksklusiwiteit en duur van borsvoeding te voorspel in ‘n uiteenlopende bevolking van moeders.

Doelwitte: Om te evalueer of ‘n verhouding tussen borsvoeding selfvetroue en die duur van eksklusiewe borsvoeding in MIV-geïnfekteerde en ongeïnfekteerde moeders bestaan, (gemeet deur die som van die BSES-SF telling). Benewens die, is die studie gemik om die verskil in eksklusiewe borsvoeding tussen MIV-geïnfekteerde en ongeïnfekteerde moeders te bepaal saam met addisionele faktore wat die moeder se borsvoeding selfvertroue kan beinvloed en dus die BSES-SF telling.

Deelnemers en metodes: ‘n Beskrywende analitiese kohortstudie was onderneem, waarvan die duur van eksklusiewe borsvoeding tot en met ses maande direk na geboorteskenking as die primêre uitkoms gestel was. Persoonlike onderhoude is gevoer met 329 vroue wat geboorte geskenk het by die Rahima Moosa Mother and Child Hospitaal in Coronationville, gedurende die periode Augustus 2014 tot Mei 2015, tydens hul hospitaal bevalling aan die hand van self-geformuleerde vraelyste, insluitende die BSES-SF. Post hospitaal opvolg was telefonies gedoen.

Resultate: Die BSES-SF tellings was ‘n positiewe bepalende faktor vir die duur van eksklusiewe borsvoeding in beide MIV-geinfekteerde en ongeinfekteerde moeders. Daar is bevind dat die BSES-SF tellings ‘n onafhanklike bepaler was van die verlengde duur van eksklusiewe borsvoeding. Ander onafhanklike bepalers van borsvoeding sluit in die voedingsmetode in die hospitaal, voorgeboorte voorneme om te borsvoed en ras.

Gevolgtrekking: Die BSES-SF is deur ons studie bevestig as ‘n waardevolle instrument om vroue te identifiseer wat die risiko loop om op ‘n vroeë stadium eksklusiewe borsvoeding te beëindig. Tesame met ander demografiese, mediese en borsvoeding faktore, behoort dit bruikbaar te wees om die beperkte hulpbronne aan te wend waar die grootste nood bestaan vir borsvoedings onderrig.

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CONTRIBUTIONS

Abigail Courtenay (AC), Dr Evette van Niekerk (EvN) and Caida MacDougall (CM) designed the research study. AC performed data collection and analysed the data with assistance from Tonia Esterhuizen (TE). AC, EvN and CM drafted the manuscript and reviewed the data. All authors read and approved the final version of the manuscript.

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LIST OF ABBREVIATIONS

AFASS	Acceptable, feasible, affordable, sustainable and safe
ART	Antiretroviral treatment
BMS	Breast milk substitute
CARMMA	Campaign on Accelerated Reduction of Maternal and Child Mortality in Africa
EBF	Exclusive breastfeeding
HIV	Human immunodeficiency virus
HSRC	Human Sciences Research Council
IYCF	Infant and young child feeding
IQ	Intelligence quotient
MBFI	Mother Baby Friendly Initiative
MNCWH	Maternal, newborn, child and women's health
Non-EBF	Non-exclusive breastfeeding
NCST	Nutrition counselling, support, and treatment
PMTCT	Prevention of mother-to-child transmission
SADHS	South African Demographic Health Survey
SANHANES-1	South African National Health and Nutrition Examination Survey
SIDS	Sudden infant death syndrome
UN	United Nations
UNICEF	United Nations Children's Fund World Health Organisation
WHO	World Health Organization

LIST OF DEFINITIONS

Breast milk substitute	Any food or drink marketed or otherwise representing a partial or total replacement of breast milk, whether or not suitable for that purpose.[1]
Complementary foods	Complementary foods means any foodstuff, whether in liquid, solid or semi-solid form, given to an infant after the age of six months as part of the transitional process during which an infant learns to eat food appropriate for his or her developmental stage while continuing to breastfeed or being fed with commercial formula.[1]
Ever breastfed	Infants who have been put to the breast, if only once; includes infants who have received expressed breast milk but have never been put to the breast.
Exclusive breastfeeding	An infant receives only breast milk and no other liquids or solids, not even water, with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines. When expressed milk is given, the preferred term is breast milk feeding.[1]
Food security	Access to and control over the physical, social and economic means to ensure sufficient, safe and nutritious food at all times, in order to meet the dietary requirements for a healthy life. Having, at all times, both physical and economic access to sufficient food to meet dietary needs for a productive and healthy life.[2]
Full breastfeeding	This definition included both exclusive breastfeeding and predominant breastfeeding.[3]
Healthcare personnel	This includes all healthcare providers and health workers.[1]
HIV-uninfected	Refers to people who have taken an HIV test with a negative result and who know their result.[1]

HIV-infected	Refers to people who have taken an HIV test whose results have been confirmed positive and who know their result.[1]
Infant formula	A formulated product manufactured for particular nutritional use by infants to satisfy, by itself, the nutritional requirements of infants during the first months of life up to the introduction of appropriate complementary foods according to the composition of which is based on the applicable Codex standard.[2]
Mixed feeding	Feeding of breast milk as well as other milks (including commercial formula or home-prepared milk), foods or liquids.[1]
Mother-to-child transmission	Transmission of HIV from an HIV-infected woman, during pregnancy, delivery or breastfeeding, to her infant.[1]
Partial breastfeeding	A situation where the baby received some breastfeeds but was also being given other food or food-based fluids, such as formula milk or weaning foods.[3]
Predominant breastfeeding	The infant's predominant source of nourishment has been breast milk. However, the infant may also have received water and water-based drinks (sweetened and flavoured water, teas, infusions etc.), fruit juice, oral rehydration salts solution, drop and syrup forms of vitamins, minerals and medicines, and ritual fluids (in limited quantities). With the exception of fruit juice and sugar-water, no food-based fluid is allowed under this definition.[3]
Regulations	Regulations Relating to Foodstuffs for Infants and Young Children (R991) under the Foodstuffs Cosmetics and Disinfectants Act, 1972 (Act No. 54 of 1972).[1]
Replacement feeding	Infants who are receiving no breast milk, with a diet that provides adequate nutrients until the age at which they

can be fully fed family foods. During the first six months of life, replacement feeding should be with a suitable commercial formula. After six months, complementary foods should be introduced.[1]

The Code

The International Code of Marketing of Breast milk Substitutes was adopted as an annex to the 1981 WHA Resolution 34.22 and includes subsequent relevant WHA Resolutions.[1]

BRIEF OUTLINE OF THE THESIS

This thesis is divided into four chapters. The outline of each chapter is as follows:

Chapter 1: Literature review: This chapter showcases the relevant and available research to give background to the investigation.

Chapter 2: Methodology of the investigation.

Chapter 3: Results of the investigation in an article format.

> Article 1: Breastfeeding self-efficacy and the duration of exclusive breastfeeding in HIV-infected mothers.

Chapter 4: Conclusions and recommendations of the study objectives and findings: A set of null hypotheses are accepted or rejected. Limitations of the study are discussed and recommendations for further research are made.

References: All references appear at the end of this thesis. When Article 1 is published, the references in the article will be extracted.

CHAPTER 1: LITERATURE REVIEW

1.1 BENEFITS OF BREASTFEEDING

An overwhelming body of evidence indicates that breastfeeding has a fundamentally positive impact on the short- and long-term health outcomes for mother and child. Breast milk is nutritionally, immunologically, endocrinologically, economically and ecologically superior to breast milk substitutes (BMS).[4] At a population level, few other health behaviours are as far-reaching with respect to the potential for improved survival, health and overall wellbeing.

Exclusive breastfeeding has many health benefits over mixed feeding[1] and high quality evidence demonstrates the negative impact of not breastfeeding in both high- and low-income settings and across a range of population groups.[5–9]

1.1.1 Infant Benefits

1.1.1.1 Short-term health benefits for the child

Not only does breast milk provide complete nutrition for an infant younger than 6 months, in the longer term it provides at least half the energy needs of a 6–12 month old, and one-third of the energy needs of a 12–24 month old.[2,10] It also provides human-specific nutrients which comprise a unique blend of proteins, carbohydrates, fats, vitamins and minerals that evolve to meet a developing infant's needs and optimise growth.[11,12]

Breast milk requires no additional preparation, transport, storage or feeding apparatus.[13–15] For this reason breastfeeding decreases the risk of infection and, subsequently, infant morbidity and mortality due to incorrect preparation or inappropriate choice of breast milk substitute (BMS) as well as contamination of the BMS or the feeding apparatus. [16–18]

Breast milk consumption activates or enhances both passive and active immunity. Passive immunity to environmental factors is activated through the immunoglobulins [19] which protect the infant against infectious diseases such as otitis media as well as gastrointestinal and respiratory infections.[20] The greater the duration and exclusivity of breastfeeding the greater the protective effect.[6] Active immunity through vaccination may also be enhanced in breastfed infants, as breast milk primes the infant's immune system for a better response.

Breastfed infants show a significantly increased antibody level response in comparison to formula-fed infants.[21]

In addition to these benefits, any breastfeeding is also associated with a 36% reduced risk of sudden infant death syndrome (SIDS).[6]

Reduced breastfeeding rates contribute to increased infant mortality (especially in malnourished children) and hospitalisation for preventable diseases (such as diarrhoeal and respiratory infections) in the first two years of life.[14,22] In developing countries, breastfeeding has had an enormous impact on protection against morbidity and mortality due to diarrhoeal disease. This is evidenced by Lamberti et al in their 2011 systematic review, which indicated that not breastfeeding was associated with a 165% increased incidence of diarrhoea in infants aged 0–5 months and a 32% increase in infants aged 6–23 months. In addition, not breastfeeding was also associated with a 952% increase in diarrhoea mortality in infants aged 0–5 months when compared with exclusive breastfeeding.[23] In the first six months of life, male and female infants who were not breastfed were 3.5 and 4.1 times more likely to die, respectively, compared with those who received any form or quantity of breast milk.[24] Finally, in older children (6–23 months), any breastfeeding was associated with a 50% reduction in mortality.[14]

1.1.1.2 Long-term health benefits for the child

The term ‘first 1 000 days of life’ refers to a critical window of opportunity that extends from conception up until the infant’s second birthday. During this period it is thought that dietary exposure may programme the occurrence of non-communicable diseases later in life. The infant’s early diet, including the type of milk consumed, has been pinpointed as a key factor that influences the development of adult diseases.[1,5]

Breast milk contains elements of the mother’s micro biome and immune responses; it is able to provide specific prebiotics to nurture the growth of beneficial bacteria in the infant’s gut whilst abnormal colonisation patterns may have damaging long-term effects. Beneficial bacterial species within the infant’s micro biome may modulate brain development and cognitive functioning, adipogenesis, metabolic responses and immune regulation.[25,26] This may explain why breastfeeding has been associated with high intelligence quotient (IQ) points as well as a reduced risk of obesity, type 2 diabetes and childhood leukaemia.

Breastfeeding is unfailingly associated with better performance in IQ testing in both children and adolescents, with a modest increase of 3.4 IQ points.[27] From an economic perspective this increase in intelligence could influence schooling and, ultimately, adult earning.[28,29]
Prolonged breastfeeding is also associated with a 13% reduction in the prevalence of overweight or obese children,[30] potentially exerting a protective effect against the incidence of type 2 diabetes (24% pooled results), particularly among adolescents.[30]
Finally, prolonged (more than six months) breastfeeding may also provide a 14–20% reduction in the incidence of all childhood leukaemias.[31]

1.1.2 Maternal Benefits

1.1.2.1 Physiological benefits

In addition to the direct health benefits to the infant, breastfeeding also presents health benefits to the mother.

Breastfeeding is associated with a reduced risk of breast cancer (7% decreased risk in women who have “ever breastfed” versus those who have “never breastfed”)[32] and a suggested protective effect against ovarian cancer (35% reduction in ovarian cancer in women who have breastfed for more than 12 months),[32] increased weight loss in some breastfeeding women,[33] statistically significant reduction in the risk of type 2 diabetes,[34] and lactational amenorrhea with exclusive or predominant breastfeeding for the first six months,[32] as well as reduced birth spacing when other forms of contraception are not available.[14]

1.1.2.2 Psychological benefits

For some women, breastfeeding provides a sense of oneness or completeness with her infant and the experience is both pleasurable and satisfying.[35] This may result in breastfeeding mothers experiencing fewer negative moods and less overall stress.[36]

Breastfeeding has been positively associated with maternal sensitivity[37] to infant cues and bonding. The bonding experience a woman feels while breastfeeding has been described as central to her identity as a mother[35] and it has been said that that breastfeeding creates a unique lifelong ‘love link’ between mother and child[38]. One of the mothers in Buskens[38] qualitative study described this love as follows:

> "When you breastfeed you communicate with the baby. When the baby looks at you, you will normally say I love you even if you don't say it in words but in your heart. The baby will respond by blinking the eye or stretching, you know, or the baby will want to say something in its own language and that is how they talk to us ..." (Mother from Soweto)

This level of bonding strengthens the mother-infant relationship to such an extent that it may actually help to protect against maternally-perpetrated child maltreatment, particularly child neglect and abandonment.[39]

1.1.3 Societal benefits

"When we nourish a child, we drive future economic growth."[40] The cost burden of caring for individuals with short-term illness or chronic disease due to lack of breastfeeding or poor breastfeeding practices is significant.[41]

The scaling up of breastfeeding could prevent up to 823 000 child deaths and 20 000 breast cancer deaths per year along with an international economic savings of about $302 billion (R4.4 quadrillion) in lost revenue due to lower IQ scores.[14]

Breastfeeding has a significant effect on linear growth and because linear growth (but not weight gain) in the first two years of life appears to have the highest impact on human capital in middle- and low-income countries such as South Africa,[29,42] breastfeeding is a key strategy to address this concern.

1.2 CURRENT BREASTFEEDING RECOMMENDATIONS

Infant survival rates can be improved significantly through the implementation of early and exclusive breastfeeding. Breastfeeding should be initiated within one hour of birth and every child, regardless of human immunodeficiency virus (HIV) status, should be exclusively breastfed on demand (i.e. unrestricted and whenever desired)[2] for the first six months without additional foods or fluids.[1,6,43,44]

The positive health outcomes associated with breastfeeding exist as a dose-response relationship, with the greatest protection from infectious diseases and morbidity resulting from prolonged breastfeeding.[22] Therefore, it is recommended that mothers continue to breastfeed their infants while introducing appropriate complementary foods to the infant's diet at six months, up to two years and beyond or as per relevant HIV guidelines. [45]

1.2.1 HIV-Uninfected Population

HIV-uninfected mothers should breastfeed their infants exclusively for the first six months, after which appropriate complementary foods should be introduced and breastfeeding should continue for two years and beyond (as long as it is mutually desirable for both the mother and infant).[1,46,47]

1.2.2 HIV-Infected Population

In 2014, approximately 25.8 million people were living with HIV in sub-Saharan Africa, with 1.4 million new HIV infections of which 190 000 were children.[48] As the majority of these new infections occur through mother-to-child transmission (MTCT),[49] the most recent HIV and infant feeding guidelines focus on modifiable factors, such as breastfeeding practices, that can help reduce these rates.[49]

Over the past 15 years, Infant and Yong Child Feeding (IYCF) recommendations for HIV-positive women have changed dramatically. The early recommendations ranged from avoiding breastfeeding with the provision of free commercial infant formula by the government,[50] to avoiding breastfeeding if certain conditions were met (affordability, feasibility, acceptability, sustainability and safety), to the latest guidelines of breastfeeding under antiretroviral therapy (ART) cover.[51] The latest recommendation is supported by evidence that shows that the risk of HIV transmission is reduced to about 1–2% when antiretroviral drugs (ARVs) are given to HIV-infected mothers, while simultaneously promoting exclusive breastfeeding for the first six months of life.[52] Even in the absence of ARVs, exclusive breastfeeding should still be promoted, as transmission rates in this population are low (approximately 4% between six weeks and six months).[53] Since breastfeeding protects infants against the most common childhood infections, the benefits of breastfeeding outweigh the risks of not-breastfeeding or formula feeding. This further supports the case for continued breastfeeding even in the absence of ART.

As the risk of HIV transmission through breast milk is undoubtedly associated with the method of infant feeding, it is vital to define exclusive breastfeeding and mixed feeding. Exclusive breastfeeding is defined as “No other food or drink, not even water, except breast milk, with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines”.[54] Mixed feeding is when the infant receives both breast milk and any other food or liquid, including water, non-human milk and formula before six months of age[54] and is associated with an increased risk of transmission compared with exclusive breastfeeding.[53]

The other liquids and foods that are given in the mixed-feeding context can damage the infant's delicate and permeable gut wall, allowing the virus to be transmitted more easily.[53] Mixed feeding also poses the same risks of contamination and diarrhoea as exclusive replacement feeding, thus increasing the risk of mortality. Therefore, encouragement of exclusive breastfeeding and avoidance of mixed feeding is one of the strategies employed to reduce transmission rates.

The duration of breastfeeding also increases the cumulative probability of transmission.[49] For this reason, breastfeeding in the context of HIV is contraindicated in countries like the United States, where the risks of HIV transmission through breastfeeding outweigh the risks for infants who are not breastfed.[55] However, in developing and resource-limited countries like South Africa, where malnutrition, diarrhoea and pneumonia are still common causes of infant and child deaths, breastfeeding is highly recommended. The current guidelines aim to maximize child survival and not only the avoidance of HIV transmission.[56]

The most recent infant feeding guidelines on prevention of mother-to-child transmission (PMTCT) 2014/15 recommends immediate initiation of ARVs for all women who are pregnant or breastfeeding[44] and exclusive breastfeeding for six months, with appropriate complementary foods being introduced from six months and continued breastfeeding until 12 months. Thereafter the mother should gradually cease breastfeeding and continue with an acceptable replacement feed such as pasteurised full cream milk.[2,44]

All HIV-infected mothers should be educated on the risks and benefits of both breast and formula feeding. If, after counselling, an HIV-infected mother chooses to formula-feed, she must understand that free formula is not routinely provided as part of the PMTCT program and must purchase her own formula in the correct frequency and amounts to ensure optimal growth and development of her infant.[44]

The only instance in which an HIV-infected mother is encouraged not to breastfeed is if the mother has been on second or third-line ART for more than three months and has a viral load of above 1000 copies.[2,44]

1.3 BREASTFEEDING SITUATION IN SOUTH AFRICA

The term “ever breastfed” can be defined as “those infants who have been put to the breast, if only once, and includes infants who have received expressed breast milk but have never been put to the breast”.[57]

The South African Demographic and Health Survey (SADHS) in 2003 showed that 81.5% of infants in South Africa have been “ever breastfed”,[58] indicating that the initiation rate is relatively high and is comparable to other countries such as Italy, Spain and Greece.[15] However, cumulative exclusive breastfeeding rates are dismally low, with a mere 11.8% and 8.3% of infants being exclusively breastfed below four and six months respectively.[58,59] In support of the 2003 SADHS, the 2012 SANHANES-1 found that 83% of children below the age of two years started breastfeeding early (within an hour after birth) and 7.4% of children below six months of age were exclusively breastfed, with 75.1% being breastfed, although not exclusively.[60] This means that South Africa has some of the lowest exclusive breastfeeding rates in the world.[56]

Bearing in mind the limitations of cross-sectional data, it seems as if “ever breastfeeding” rates are decreasing over time (88.1% in 1994, 86.7% in 1998 and 81.5% in 2004) but early initiation of breastfeeding (45.3% in 1998, 61.1% in 2004 and 83.0% in 2012) and duration of exclusive breastfeeding (10.4% and 7.0% to 11.8% and 8.3% at below four and six months respectively) have increased.[58–60] This may indicate that while fewer mothers are breastfeeding, hospital practices and education encouraging exclusivity have improved as mothers who do choose to breastfeed are initiating breastfeeding early and maintaining breastfeeding for a longer duration.

Mixed feeding is commonplace amongst all breastfeeding mothers. Exclusive breastfeeding may be seen as impractical, counterintuitive or it may even conflict with a mother’s own understanding and beliefs.[38] Solid food, usually in the form of soft mieliemeal porridge, is often given from birth or as early as ten days because, although mothers are aware that breast milk is important, alone it is considered insufficient or deficient in nutrients.[38] The SANHANES-1 found that the average breastfeeding duration of infants aged 0–11 months was four months, with just over two-thirds (64%) of infants being fed either solid or semi-solid foods before six months of age (this is an increasing trend when compared with the SADHS results in 2003 where 49.4% of infants were being fed solids before six months).[60] Other than food, water is commonly given to infants from a very early age as it is believed

that “water is life” and that it helps to prevent dehydration and constipation, and assists in cleansing the infant’s system.[38] Over-the-counter and traditional medications (such as Umfula in the Western Cape or tshiunza in Limpopo Province[61]) are also commonly administered to give the baby energy to grow well, cleanse the infant and allow the passing of the first stool or to treat or prevent disease.[38]

1.4 DETERMINANTS OF BREASTFEEDING

Evidence suggests that a ‘rapid’ change in breastfeeding rates can be brought about if a concerted effort is made by our country to scale up breastfeeding interventions, policies and programmes to create an enabling environment for breastfeeding mothers.[13]

In order to address low adherence to breastfeeding recommendations, the determinants associated with breastfeeding must be understood. Reasons for avoidance or early cessation of breastfeeding can be attributed to various medical, cultural, and psychological factors, as well as physical discomfort or inconvenience.[62] Although numerous and complex, these factors can be grouped into key determinants that can affect optimal breastfeeding. (Figure 1).[13]

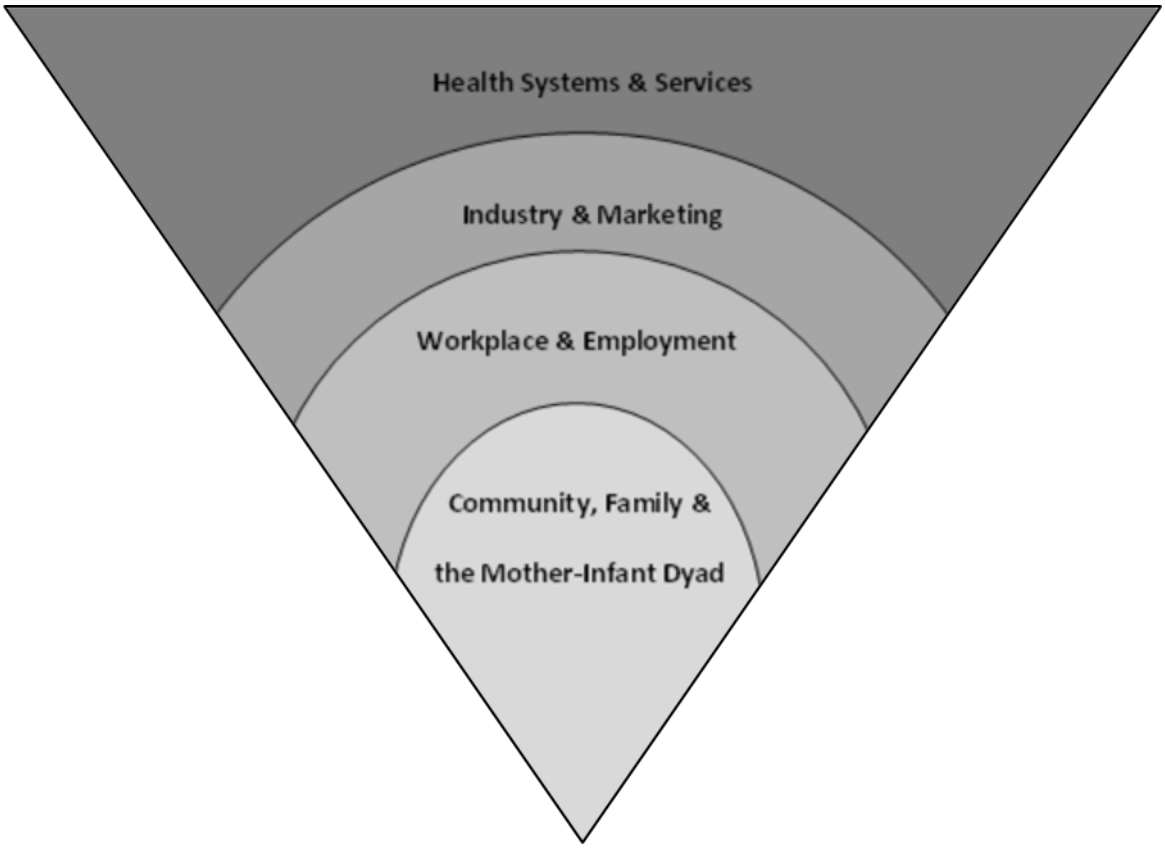

Figure 1: Key determinants that influence optimal breastfeeding practices

(Adapted from The Lancet series, 2016)[13]

These key determinants will be briefly discussed below and South African events, milestones and shortfalls will be highlighted.

1.4.1 Health Systems and Services

To improve exclusive breastfeeding rates and subsequently reduce child mortality, infant feeding policies, regulatory frameworks and guidelines must be implemented on a national level with strong political commitment at the highest levels of government leadership.[1,45]

In South Africa, there has already been some political commitment in the form of the Tshwane declaration.[63] This was a response to the challenges the country was facing in achieving the Millennium Development Goals (MDGs) to reduce child mortality and improve maternal health by 2015 (goals 3 and 4).[64] Various stakeholders have made a commitment to support and strengthen efforts to promote breastfeeding and establish a new normal: where every woman can expect to breastfeed, and receive the necessary support.[62] Hence, South Africa declared itself a country that actively supports, promotes and protects exclusive breastfeeding, and as one that is willing to take action to prove its commitment.

These measures include mainstreaming breastfeeding in all relevant policies, legislation, strategies and protocols, some of which include the Nutrition Roadmap, Infant and Young Child Feeding (IYCF) policy, Regulation 991; as well as the Mother-Baby Friendly Initiative (MBFI). These documents draw inspiration from the previous MDGs, current Sustainable Development Goals (SDGs) and Global WHO and WHA targets.

1.4.1.1 Infant and Young Child Feeding (IYCF) policy

Evidence indicates that infant and young child feeding practices (such as exclusive breastfeeding) are enhanced when women receive skilled antenatal, intrapartum, postnatal and follow-up support from healthcare personnel. It is vital that healthcare personnel remain up to date with evidence-based knowledge so that they can provide appropriate support and counselling to mothers and caregivers.[1]

The IYCF policy aims “To promote optimal nutritional status, growth, development and improve health and child survival outcomes of infants and young children in South Africa”[1] by equipping healthcare workers with a policy that encompasses the most recent available evidence-based knowledge and programmatic experience. The key components of the

IYCF policy include early initiation of breastfeeding in health facilities as well as exclusive breastfeeding for the first six months, with continued breastfeeding for two years and beyond. It also guides action with respect to infant feeding and HIV, the appropriate use of breast milk substitutes, complementary feeding and feeding in difficult circumstances, as well as outlining the responsibilities of healthcare workers when implementing woman and child health at all levels.[1]

The IYCF policy is in line with national and global initiatives including the Convention on the Rights of the Child, which recognises the importance of breastfeeding in the achievement of "the child's right to the highest attainable standard of health"[65]. It is also aligned with the Global Strategy for Infant and Young Child Feeding, the International Code of Marketing of Breast-milk Substitutes (The Code), the Innocenti Declaration, the Baby Friendly Hospital Initiative (BFHI)/ Mother-Baby Friendly Initiative (MBFI), the United Nations (UN) Joint Guideline on HIV and Infant Feeding, 2010, the Campaign on Accelerated Reduction of Maternal and Child Mortality in Africa (CARMMA), Roadmap for Nutrition in South Africa, the Strategic Plan for Maternal, Newborn, Child and Women's Health (MNCWH) and Nutrition and the National Guidelines on Nutrition Counselling, Support, and Treatment (NCST) for Malnourished Individuals.[1]

1.4.1.2 Millennium Development Goals (MDG)

At the UN Millennium Summit in 2000, a consensus was reached by the international community on strategies to achieve eight critical social and economic development priorities by 2015. Following the Tshwane declaration in 2011[63], the National Nutrition Directorate developed the National Implementation Plan for Breastfeeding Promotion in South Africa. This plan highlighted that breastfeeding, especially exclusive breastfeeding, is crucial in achieving MDG 4 for child survival as well as contributing to MDGs 5 and 6 to improve maternal health and to combat HIV/AIDS respectively.[64,66] Although policies, strategies and regulations are in place within the relevant individual departmental portfolios regarding nutrition intervention, it is apparent that the level of commitment to nutrition within these departments is uneven with less than 0.3% of the national health budget being allocated to nutrition, including breastfeeding interventions.[67] As a result, the MDG were not met in the proposed time frame and infant and child mortality rates are still unacceptably high.

1.4.1.3 Sustainable Development Goals, 2030

With the deadline of the MDG's past, the Sustainable Development Goals (SDGs) were launched in September 2015. Not forsaking the unfinished business of the MDGs, the SDGs is a 'to do list' for the next 15 years. It is broad and ambitious in scope, and the agenda addresses the three dimensions of sustainable development: social, economic and environmental, as well as important aspects related to peace, justice and effective institutions. Goals 1 (End poverty in all its forms everywhere), 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture) and 3 (Ensure healthy lives and promote well-being for all at all ages) focus specifically on nutrition. Goal 2 explicitly commits to the World Health Assembly global nutrition targets for 2025.

1.4.1.4 World Health Assembly (WHA) Global Nutrition targets 2025[45]

The burden of malnutrition is being addressed through an all-inclusive implementation plan on maternal, infant and young child nutrition which has specified a set of six global nutrition targets that by 2025 aim to:

1. "Achieve a 40% reduction in the number of children under 5 who are stunted;
2. Achieve a 50% reduction of anaemia in women of reproductive age;
3. Achieve a 30% reduction in low birth weight;
4. Ensure that there is no increase in childhood overweight;
5. **Increase the rate of exclusive breastfeeding in the first 6 months up to at least 50%;**
6. Reduce and maintain childhood wasting to less than 5%."[45]

1.4.1.5 Baby Friendly Hospital Initiative

The Baby-Friendly Hospital Initiative (BFHI), was developed by WHO and the United Nations Children's Fund (UNICEF) and was first implemented in 1990 in response to the Innocenti Declaration[65] on the protection, promotion and support of breastfeeding.[68] In South Africa the BHFI has been renamed to the Mother Baby Friendly Initiative (MBFI) to shift the context from solely a hospital based setting as well as to further emphasise the importance of the initiative in reducing both infant and maternal morbidity and mortality. In recent years, the MBFI has been in the spotlight in South Africa as the Tshwane declaration called for all hospitals and health facilities (public and private) to be baby-friendly accredited by 2015. Although progress has been made in this regard, this target has not yet been reached.

Improved maternal care practices are an effective intervention to increase the initiation and duration of breastfeeding.[1] MBFI supports the implementation of safe and appropriate infant feeding and mother-friendly practices at all levels of healthcare through the "Ten steps for successful breastfeeding and three additional items". Thus, MBFI has the potential to improve maternal and child mortality[68] through improved breastfeeding rates.

UNICEF's (1999) ten steps for successful breastfeeding[68] include:

1. "Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within half an hour of birth.
5. Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants.
6. Give new born infants no food or drink other than breast milk, unless medically indicated.
7. Practise rooming-in – that is, allowing mothers and infants to remain together – 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic."[68]

In the South African context, the efficacy of the BFHI/ MBFI model can be seen in a study conducted in the Mpumalanga Province. A sub-district where all the public health maternity facilities were baby-friendly had higher levels of early initiation of breastfeeding and EBF than in a sub-district where none of the facilities were baby-friendly. Thus this study strengthens the evidence that the MBFI appeared to successfully improve infant-feeding practices for at least the first six months of life in the South African context.[69]

In health systems, healthcare providers have the power to influence feeding decisions at key moments before and after birth. When challenges occur later in the breastfeeding journey, their influence and support (or lack thereof) may determine if a mother continues to maintain exclusive and continued breastfeeding.[13]

1.4.1.6 Intrapartum experience

Hospital policies like the MBFI have been established to set the standard for optimal intrapartum care. The MBFI's "ten steps for successful breastfeeding" aims to eradicate hospital practices that interfere unnecessarily with breastfeeding. Unfortunately, these policies are not yet well established and translation of research into practice, even when sufficient information is provided and professional guidelines are developed,[70] is often met with barriers and delays.[71–73]

Considerable gaps in knowledge and skills to support breastfeeding are reported at all levels of healthcare staff.[71,74,75] Those who do not remain up to date with the current literature[1] or who base their decisions on perceptions and beliefs can be a source of misinformation and may interfere with breastfeeding by restricting breastfeeds unnecessarily and encouraging early supplementation with infant formula. In addition, adequate nutrition services are often hindered by health workers' heavy workload, leaving them little time to engage with policies, strategies, or guidelines[42] or to absorb the instructions adequately.[42]

1.4.1.6.1 Restricting breastfeeds

If the hospital does not adhere to practices in accordance with MBFI, they may incorrectly separate the mother and infant or restrict breastfeeding.[76] In these events, early supplementation is more likely to occur.[77]

1.4.1.6.2 Early supplementation

Healthcare workers may give infant formula or glucose water in the belief that it will help prevent dehydration, hypoglycaemia, and neonatal jaundice.[78,79] Despite being aware of policies supporting exclusive breastfeeding, some nurses may also give infant formula if they believe the infant is unsettled due to low milk supply[77–81] and that the formula will make the infant sleep longer, or they may want to give the mother a break in the hope that if rested, the mother will be more likely to continue to breastfeed, thus aiding a longer duration of breastfeeding.[82] Numerous publications indicate that mixed feeding in the hospital setting is associated with poor breastfeeding outcomes[83–86] and that optimising breastfeeding in the hospital setting (proper MBFI support) is one of the most effective interventions to improve breastfeeding rates .[87]

1.4.1.7 Postpartum experience

Breastfeeding has traditionally been thought to be the sole responsibility of the mother, as it is her individual choice,[13,38] she still needs skilled and sufficient postpartum healthcare support, as breastfeeding is something that needs to be learnt over time. Hospital policies like MBFI focus mainly on mothers in the intrapartum period, who leave the hospital already breastfeeding, and provide limited support after discharge from hospital.[88] New mothers need instruction from healthcare staff as well as encouragement from those close to them. Poor breastfeeding practices (such as incorrect positioning and latching) as well as anticipation of breastfeeding difficulties (such as doubts about producing enough milk for their infant), coupled with lack of guidance and encouragement from healthcare personnel due to time constraints or other reasons, can contribute to the discontinuation of exclusive breastfeeding after discharge.[1,13]

1.4.1.7.1 Incorrect useage of growth charts

Another example of how healthcare staff may contribute to the cessation of exclusive breastfeeding is the incorrect use of growth charts. WHO has published comprehensive growth charts that were developed using data on breastfeeding infants.[89] These charts have been incorporated into the South African Road to Health booklets that every infant should receive at birth. In South Africa, mothers are encouraged to take their infants to their local primary healthcare facility for growth monitoring and promotion, once a month for the first two years of life. If the incorrect weight charts are used (based on formula fed infants) or if the charts are interpreted incorrectly, it may imply that healthy breastfed infants are underweight and additional food or fluid may be given before six months in the belief that it will assist with weight gain.[82,90] If a child's growth is genuinely faltering or the child has a significant illness; this could also lead to an interruption in breastfeeding or supplementation with infant formula, which would increase the risk of exclusive breastfeeding failure.

1.4.2 Industry and Marketing

1.4.2.1 The International Code of Marketing of Breast Milk Substitutes for infants and young children and regulations relating to foodstuffs

Declining breastfeeding rates can, in part, be attributed to the on-going and aggressive promotion of breast milk substitutes (BMS) by their manufacturers and distributors[4] as well as the free distribution of formula milk by governmental hospitals or clinics in the past in an effort to prevent mother-to-child transmission of HIV.[1]

Through their marketing techniques, manufacturers and distributors have created the perception that breast milk substitutes are the norm for infant feeding, when in fact it should be seen as a specialised food only to be used as a last resort.[4] In South Africa, milk formula sales account for two-thirds of all baby food sales, with local sales reaching up to R3.3 billion per annum.[91] This growth is not surprising, considering that the promotion of BMS by manufacturers far outweighs any investment or spending by the South African government to promote, support and protect breastfeeding.[4,92]

The aim of the International Code of Marketing of Breast-Milk Substitutes and its subsequent resolutions (The Code) are intended to protect the public and healthcare providers from inappropriate marketing strategies used by BMS companies.[4] Marketing practices usually employed for products and services are unsuitable for BMS which should not be marketed or distributed in ways that may obstruct the protection and promotion of breastfeeding.[4]

The Code applies to the marketing and distribution of the following products:

> "BMS, including infant formula and other milk products; foods and beverages, including bottle-fed complementary foods, when marketed or otherwise represented to be suitable, with or without modification, for use as a partial or total replacement of breast milk and feeding bottles and teats."[93]

In December 2012, one year after the Tshwane declaration, the South African Department of Health gazetted the Regulations Relating to Foodstuffs for Infants and Young Children (R991) under the Foodstuffs Cosmetics and Disinfectants Act, 1972 (Act No. 54 of 1972).

As The Code has no legal standing in South Africa, these regulations provide the legal backbone to which industry must comply. The regulations restrict inappropriate marketing practices and deal with labelling, educational information and responsibilities of health authorities, all of which were previously used to promote foodstuffs for infants and young children.[94]

While sufficient institutional and legal structures for implementation of successful breastfeeding strategies exist, numerous additional factors play a role in the success of a breastfeeding mother. Coordination between the South African Department of Health (DoH) and other governmental departments to deliver adequate breastfeeding support is lacking,[42] and while media and social marketing campaigns have been shown to improve attitudes

and public perceptions towards breastfeeding,[95,96] insufficient emphasis is placed on promoting breastfeeding to warrant change. In South Africa, mass media such as television and radio, including the use of celebrities, could be used to educate pregnant women and mothers with children younger than five years about the importance of good nutrition and promote breastfeeding.[97]

1.4.3 Workplace and Employment Practices

Breastfeeding duration, but not breastfeeding initiation, has been found to be negatively affected by the intention to return to paid employment, especially when the mother does not have adequate support structures at home[1] or if she is returning to a high-intensity job (using daily work hours as a measure of intensity). In addition to this, if a mother has to return to employment after a short maternity leave (less than six weeks), she is four times more likely to not establish breastfeeding or be at risk of early cessation.[98] The reasons for this are multi-dimensional and may include fatigue, practicality, intensity and lack of facilities in the workplace to breastfeed or express breast milk.[99] When infants are left in the care of others, they are likely to receive mixed feedings, i.e. breast milk when with their mothers, and alternative feeding options when being cared for by others.[49]

South Africa's Constitution,[100] Labour Relations Act,[101] Employment Equity Act,[102] and Basic Conditions of Employment Act[103] offer specific legislation to regulate maternity leave and protect women from discrimination related to pregnancy. In South Africa, four months maternity leave[104] is permitted but unfortunately this is largely unpaid leave. The Tshwane declaration urged that legislation in this regard be reviewed in order to protect and extend maternity leave as well as to provide an enabling breastfeeding environment for new mothers returning to work. To date, this has not been implemented effectively, thus leaving economically active mothers and their infants vulnerable to sub-optimal feeding and care practices.

1.4.4 Family, Community and the Mother-Infant Dyad

Although breastfeeding is the most natural and instinctive way to feed an infant, it is essential to create an enabling environment for it to become the norm. The attitudes of those close to the mother, including family and friends, healthcare professionals and peers, opinions around breastfeeding in public as well as employment practices can all affect the duration of breastfeeding.[15]

1.4.4.1 Attitudes of healthcare professionals

When investigating the sources mothers rely on for infant feeding options, a study done by Davis found that 80% of mothers made decisions based on information provided to them by healthcare workers.[105] Supporting this, evidence shows that all forms of lay and professional support have been found to increase the duration and/or exclusivity of breastfeeding by varying degrees up to six months postpartum.[95] In a large cohort study in Kwa-Zulu Natal, where women received home-based peer counselling, exclusive breastfeeding rates in that HIV-prevalent population improved dramatically, demonstrating that adequate counselling can increase breastfeeding rates significantly.[106]

Conversely, the successful implementation of breastfeeding is hindered by nurses', inconsistent[107,108] or incorrect advice[1,109] and inadequate skills to directly support the breastfeeding mother.[42] This, together with inconsistent training on breastfeeding and healthcare staff shortages,[42] may also have the potential to influence breastfeeding outcomes negatively. Reported instances of this include cases where nurses were unsure of the benefits of breastfeeding after six months or during illness [42] or where healthcare professional's strongly suggest that an HIV-infected mother formula feed her infant due to their own personal beliefs that HIV transmission when breastfeeding is a certainty instead of a possibility[38] resulting in breastfeeding avoidance or early cessation. In light of this, Davis[105] found that only 65% of the health worker respondents admitted that they could take a neutral stance during a counselling session. Of those who could not maintain neutrality, 60% still believed that it was in the mother's best interests to be counselled by them. Thus, when healthcare professionals are trained, their attitudes and beliefs should be challenged to eradicate unsubstantiated beliefs about the parity between breastfeeding and commercial breast milk substitutes,[46] to ensure that there is one strong and clear message from all.

1.4.4.2 Attitudes about breastfeeding in public

Current policy, the media and general society do not adequately support breastfeeding in public. It is not seen as 'normal' and as a result public breastfeeding is disapproved of and sometimes even prohibited.[13,110] The Normalise Public Breastfeeding in South Africa (NPBSA) lobby group reports that mothers are often made to feel awkward or embarrassed if they chooses to do so.[109,110] This disapproval and the absence of public facilities within which to breastfeed[111] may lead to the decision to stop breastfeeding prematurely.

1.4.4.3 Attitudes of family and close friends

Perceived support has consistently been associated with optimistic breastfeeding outcomes[95,112] leading to the conclusion that the attitudes and preferences of family and close friends play a pivotal role in the mother's breastfeeding journey. Fathers, mothers-in-law, aunts and other family members often provide feeding advice to the mother and so this decision is not hers alone.[69,106,113,114] Perceived or actual support from a partner can also influence breastfeeding outcomes where little support can contribute to low levels of breastfeeding and higher support can contribute to longer durations of breastfeeding. [115,116]

Grandmothers have a strong influence over what mothers feed their babies.[117,115] A recent systematic review, which included both developed and developing countries such as Taiwan, Kuwait, Vietnam, Germany, China, Thailand, Bolivia, USA and Brazil, concluded that if a grandmother had a positive breastfeeding opinion, the mother was up to 12% more likely to initiate breastfeeding. Conversely, if the grandmother had a negative breastfeeding opinion, it could decrease the chances of the mother breastfeeding by up to 70%.[117]

In addition to low breastfeeding rates in mothers with little or no social support, HIV-infected mothers may not practice the recommended behaviours optimally due to the perceptions and beliefs of their family and close friends, despite adequate counselling on PMTCT and infant feeding.[107,108] There is often a stigma[92,107,118] associated with exclusive breastfeeding (where mixed feeding is the norm)[38,118] as well as weaning at the recommended age of one year (where prolonged breastfeeding is the norm),[38] as both tend to raise suspicions about the mother's HIV status.

1.4.5 The Mother-Infant Dyad

At the most intimate level, a woman's breastfeeding behaviour is influenced by her personal attributes, her infant's attributes[14] and her perceptions towards breastfeeding.[119]

1.4.5.1 Personal attributes

1.4.5.1.1 Biological factors

The following biological factors[120] are negatively associated with breastfeeding outcomes:

- Primiparity[83,84,121–123]
- No prior breastfeeding experience[85]
- Maternal obesity[124,125]
- Caesarean section delivery[83,84,125]
- Introduction of formula for non-medical reasons (i.e. mixed feeding)[83–86]
- Limited prenatal education[126–128]
- Maternal tobacco use during or after pregnancy[121,124–126,129,130]

A mother's HIV status and subsequent fear of transmitting HIV to her new born is another factor that impacts a mother's decision to avoid breastfeeding.[1,131] As described earlier, the HIV and infant feeding guidelines have changed frequesntly and as a result uncertainty and misinformation from healthcare professionals surrounding the correct form and duration of feeding for an HIV-exposed infant can also play a role in breastfeeding avoidance and may also have a spill-over effect influencing an HIV-uninfected mother's decision to breastfeed as well.[1,111] Other than this, factors that influence a HIV-infected mother's intention to breastfeed as well as her actual duration of exclusive breastfeeding are similar to those of an HIV-uninfected mother.

1.4.5.1.2 Demographic factors

The following demographic factors[120] are negatively associated with breastfeeding outcomes:

- Younger maternal age[84,121–127,129,132]
- Single marital status[121,122,133]
- Lower maternal education[84,121,122,124,126,132]
- Lower household income[121,122,126,132]
- Return to work after birth[121,123,124,134–136]
- Living in an urban area[123]

In the HIV-infected population, studies investigating education and intention to breastfeed exclusively are mixed. In one study in Malawi, mothers who were educated at a higher level

did not intend to breastfeed for an increased duration, possibly because they were more likely to be financially empowered and could afford replacement feeding, or they may have wanted to conceal their HIV status from others and protect themselves from the stigma attached to avoidance of breastfeeding.[131]

The relationship between ethnicity and breastfeeding is not fully understood in the South African context. Results are mixed depending on the country and cultural aspects of the sample. In America, African women are less likely to initiate and maintain breastfeeding than white women, even after confounding variables such as maternal age and level of education, were controlled,[137] while in the United Kingdom, white women are 69% less likely to breastfeed than their non-white counterparts.[83] Although studies with regard to ethnicity are mixed, cultural traditions should not be overlooked as they may significantly influence when a mother decides to wean her child.

1.4.5.2 Infant's attributes

The growth, development and wellness of an infant can also influence the mother's breastfeeding outcomes. Rapid or poor growth,[138] advanced neuromotor development,[138,139] illness[138,140] and how the mother perceives her infant's hunger can all affect an infant's appetite. Thus these infants are more likely to receive complementary feedings (formula or solid foods) earlier, in the hope that they will meet their actual or perceived growth needs.[138]

1.4.5.3 Maternal perceptions

Nearly all women are biologically capable of breastfeeding,[13] however, a mother's decision to breastfeed exclusively for the appropriate time is greatly influenced by her intentions to breastfeed and her perceptions towards breastfeeding and the related benefits or difficulties.[112]

The duration that a mother intends to breastfeed has been significantly associated with breastfeeding outcomes at both one week and four months postpartum.[112] It was found that mothers who intended to breastfeed for less than six months or those who expressed uncertainty were 2.4 times more likely to discontinue breastfeeding prematurely when compared with those whose intentions were to breastfeed for more than 12 months.[112]
Similar findings were identified in the HIV-infected populations where antenatal intention to breastfeed was found to be a significant factor associated with the duration of exclusive

breastfeeding;[131] women who did not intend to breastfeed or those who were undecided about their breastfeeding intentions were 5.6 times more likely to stop breastfeeding by 12 weeks postpartum.[92]

Similarly, the importance of maternal confidence in relation to breastfeeding outcomes (pre- and postnatally) has been cited frequently.[141] Of 11 psychosocial and demographic factors found to influence breastfeeding duration, breastfeeding confidence was the most significant. Women who were found to have low breastfeeding confidence were described as being 3.1 times more likely to discontinue breastfeeding prematurely compared with women who were found to be highly confident.[142]

Prenatally, women who have lower levels of confidence are 4–5 times more likely to abandon their breastfeeding goals in the postnatal period compared with those with higher levels of confidence.[142] Failure to establish breastfeeding in the early postnatal period is associated with significantly lower breastfeeding confidence and is a key factor in the decision to stop breastfeeding.[141]

Breastfeeding confidence has also been associated with maternal perceptions of insufficient milk (PIM).[112,141,142] PIM is defined as a mother's belief that her breast milk is inadequate in amount or nutritional quality to meet her infant's needs[143] and is closely linked to southern African mothers' belief that breast milk is a "drink" and not "real food".[38] In a study done in Kenya,[144] mothers believed that milk production and quality was affected by hunger (thus directly relating to food insecurity), consequently contributing to PIM and anxiety about infant hunger.[144] PIM is the most common reason cited for premature discontinuation of breastfeeding or supplementation across all socioeconomic, cultural, rural and urban settings.[145] PIM has been linked to lower maternal confidence at 1,[141] 4[145] and 6 weeks.[141]

Siziba et al found that only one-third of South African mothers identified that breast milk was important as it "contained adequate nutrients for their infant". The remaining two-thirds may not have had a clear perception or understanding of the importance of the nutritional quality of breast milk.[119] If a mother believes that BMS is superior or of equal nutritional value to breast milk, she may see no reason to breastfeed her infant exclusively for six months or longer, or may even believe that her breast milk is inferior in quality, leading to PIM. In the HIV population successful breastfeeding outcomes are observed when a mother believes her breast milk is sufficient to nourish her baby up to six months[146] as well as the belief that

if exclusive breastfeeding is practised properly, the incidence of mother-to-child transmission of HIV is very low.[146] Because mothers often have unrealistic expectations of how newborns behave, they may experience difficulty caring for them.[147] When an infant cries or fusses[148] more than expected, the mother may interpret it as hunger[149] due to PIM, and often supplementation is seen as the solution to such difficulties.[150]

While the causes of PIM are unclear, it is linked with delayed initiation of breastfeeding, inadequate breastfeeding knowledge, insufficient contact between mother and infant, infant crying behaviour, breastfeeding mismanagement[151] (with mothers with self-reported breast health problems being associated with a three-fold risk of premature cessation of breastfeeding[92]) and breastfeeding self-efficacy.[145]

In order for healthcare workers to develop successful intervention strategies to address exclusive breastfeeding failure, attention must be paid to modifiable factors that are amenable to intervention .[142] Addressing maternal perceptions, including but not limited to PIM, is a critical strategy to improve breastfeeding outcomes. A common and modifiable factor associated with breastfeeding outcomes, pre- and postnatally, is breastfeeding confidence (self-efficacy).[112,145]

Breastfeeding self-efficacy is defined as a mother's confidence in her ability to breastfeed her new born and is, both pre- and postnatally, positively associated with and predictive of breastfeeding duration and exclusivity in various cultures and age groups.[76,142]

Although breastfeeding confidence is a notable variable in the successful continuation of breastfeeding, it had always suffered from a lack of theoretical perspective. In order to support the conceptual development of breastfeeding confidence, Dennis[142] incorporated Bandura's social cognitive theory[152] and developed the breastfeeding self-efficacy theory.

1.5 SELF-EFFICACY THEORY

The self-efficacy theory originated from Bandura's social learning theory and can be described as a cognitive process of an individual's confidence in their perceived ability to regulate their motivation, emotional states, thought processes and social environment in performing a specific behaviour.[142]

Through multiple correlations and causal associations, self-efficacy is predictive of health behaviours. Self-efficacy mirrors an individual's perceptions about their abilities and not

necessarily their true abilities, and thus is an essential variable in the performance of a specific behaviour in a particular situation.[142]

Self-efficacy expectations comprise two parts: outcome expectations (the belief that a given behaviour will produce a particular outcome) and self-efficacy expectations (the conviction that one can successfully perform a certain task or behaviour to produce the desired outcome). The distinction between these two concepts is important, as an individual may believe that certain behaviour may help him/her reach a specific goal but may feel unable to perform that behaviour in certain situations. Thus, belief in the outcome of the behaviour alone does not result in action unless the individual also believes that the behaviour can also be executed successfully.[142]

1.6 BREASTFEEDING SELF-EFFICACY THEORY

To conceptualise breastfeeding confidence, the breastfeeding self-efficacy theory was developed.[142]

1.6.1 Development of Breastfeeding Self-Efficacy Expectations

In order to initiate, perform and maintain a behaviour such as breastfeeding, the individual draws from four sources of information: (1) own performance accomplishments, (2) vicarious experience, (3) verbal persuasion and (4) physiological response.[132] This information helps to create expectations of one's ability to engage in or master the behaviour and determines which behaviours an individual will eventually engage in[142] (Figure 2).

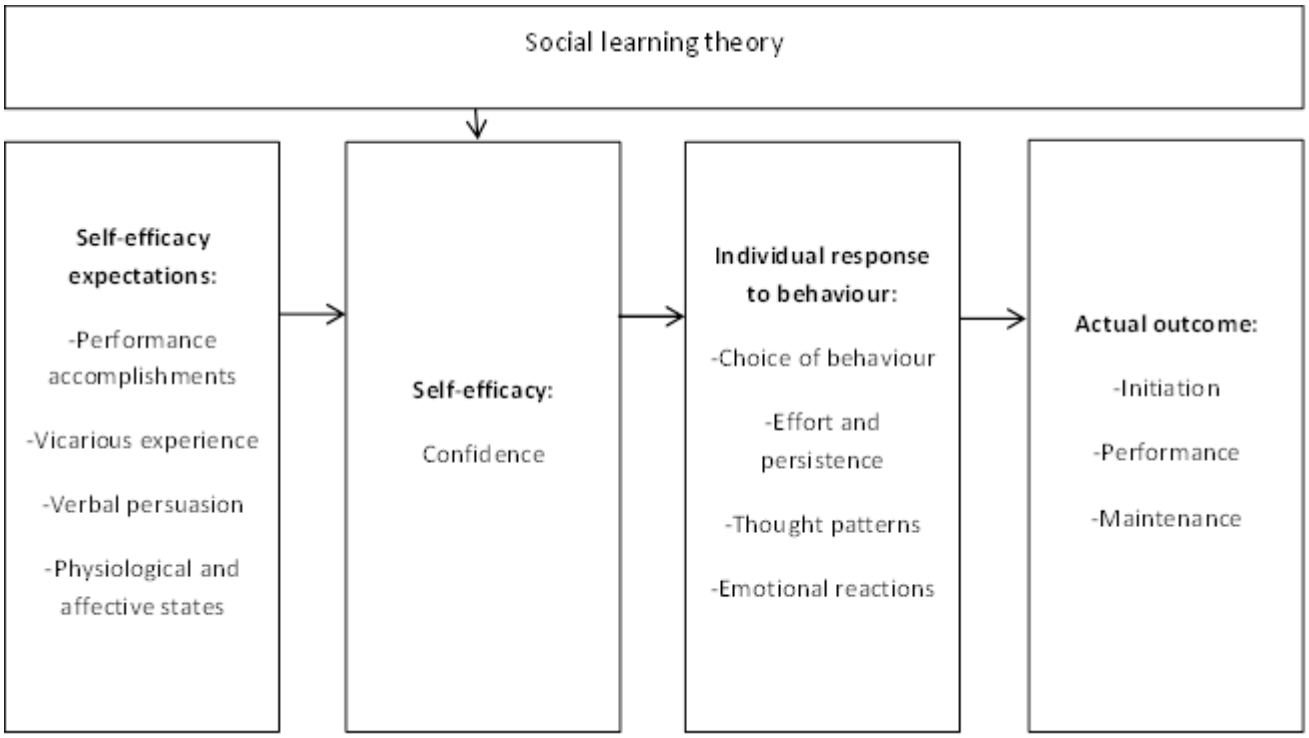

Figure 2: Self-efficacy framework

(Adapted from Dennis 1999)[142]

1.6.1.1 Performance accomplishments

Personal experience is often the most direct and powerful source of efficacy information. Successful performances increase self-efficacy, whereas repeated failures reduce it. Breastfeeding self-efficacy and thus the continuation of breastfeeding is strongly influenced by previous successful breastfeeding experiences. However, it is not only the outcome of the performance that influences perceived breastfeeding self-efficacy but also the complexity of the task, the effort expended, the amount of help needed or received to facilitate or hinder a specific performance.[142]

For example, a new mother may not conclude much about her breastfeeding abilities if she succeeds effortlessly at a task that she perceives to be uncomplicated, such as positioning her infant correctly at her breast. However, if she fails at this supposedly simple task, it may negatively influence her self-efficacy.[142] Often, mothers who were unable to breastfeed successfully with their first child, are less likely to attempt breastfeeding in successive pregnancies.[153] On the other hand, if she succeeds at a complicated task, such as successfully latching her new infant, it can greatly increase her self-efficacy. The effect of

the experience on the mother's self-efficacy depends on that mother's individual interpretation of her performance and of the desired outcome. If the mother focuses her attention on successful or improved aspects of her performance rather than unsuccessful aspects, she will have higher perceptions of self-efficacy.[142]

1.6.1.2 Vicarious experience

Performances by other individuals (live, recorded or printed) can also serve as a valuable source of observational learning about skills and abilities especially in the absence of previous experience. For example, the probability of a woman choosing to and succeeding at breastfeeding is more likely if she has seen friends and family members breastfeed successfully, while those who have never seen an infant breastfed report that breastfeeding evokes feelings of awkwardness and embarrassment.[142]

If past performance has yielded mixed results, learning through observation while employing effective coping strategies can positively influence self-efficacy. The personal qualities of the role models and the way the demonstration is performed will influence the extent of the mother's learning. Role models, who are more competent at the behaviour being modelled, but still psychosocially and demographically similar to the target audience, seem to be the most effective. An example of a positive role model to promote breastfeeding behaviours would be peer counsellors who have successfully breastfed their own infant, who simplify the complex act of breastfeeding by breaking it down into easy-to-follow steps.[142]

1.6.1.3 Verbal persuasion

As individuals readily accept the judgements of others as a valid evaluation of their own abilities, verbal persuasion can influence the mother's levels of self-efficacy, particularly if her peers and healthcare workers direct attention to the successful aspects of her breastfeeding experience and praise new and existing breastfeeding skills. The more credible the source of verbal persuasion, the more likely it is to strengthen the mother's breastfeeding self-efficacy.[142,154]

1.6.1.4 Physiological and affective states

A person's emotional and physiological state influences their perceived ability, and therefore their self-efficacy, to perform the task at hand. Positive states, such as excitement or satisfaction, have the ability to enhance self-efficacy, while negative states, such as pain,

fatigue, anxiety, or stress, reduce self-efficacy.[142] An example of this, in a southern African context, is the belief that negative emotions such as anger can affect breast milk supply or even contaminate milk. This may lead to breastfeeding avoidance or PIM.[38]

Not only can their emotional and physiological state affect breastfeeding self-efficacy, but it can also affect the breastfeeding process where there may be interference with the let-down reflex, breast emptying and subsequent milk supply, ultimately leading to actual or perceived insufficient milk.[155,156]

According to the self-efficacy theory, the most powerful source of efficacy information is performance accomplishments through actual mastery of the task at hand.[142] When exploring a mother's perceived ability to breastfeed, this together with the mother's physiological state was illustrated when mothers had higher breastfeeding confidence at one week postpartum versus directly after birth.[132]

1.6.2 Influence of Self-Efficacy on Breastfeeding Behaviour

Self-efficacy expectations influence the behaviours that individuals engage in through four general processes: (1) choice of behaviours, (2) the amount of effort expended and level of perseverance to master the task at hand, (3) thought patterns and (4) emotional reactions.

1.6.2.1 Choice of behaviour (to breastfeed, or not to breastfeed)

A person will avoid engaging in behaviours that they believe outweigh their abilities, and will only pursue those that they believe they are capable of. Their level of self-efficacy will determine how many times they will attempt a task before giving up and to what degree they will commit to their goals. For example, women who were anxious about their ability to breastfeed or who were 'scared' to breastfeed were less likely to initiate breastfeeding. Those who did initiate breastfeeding frequently established goals, and their commitment to these goals was a predictor of continued breastfeeding.[142]

1.6.2.2 Effort expenditure and persistence

The laborious process of learning to and persisting with breastfeeding requires a significant amount of effort, motivation, and support. A person with a strong sense of self-efficacy will participate fully in the activity at hand, enduring difficulties and setbacks, and increasing

their efforts if they fail. Persistence is a common trait amongst successful breastfeeding mothers in confronting breastfeeding difficulties.[142]

1.6.2.3 Thought patterns

People with high levels of self-efficacy possess self-enhancing thought patterns and are able to maintain elevated expectations and envision a successful outcome. They react to difficulties by thinking of ways to solve the problem, rather than responding emotionally. Those with low self-efficacy focus on their deficiencies visualise failure and are self-defeating. A breastfeeding mother who encounters difficulties and doubts is faced with the possibility of quitting breastfeeding versus the challenge of personal commitment.

1.6.2.4 Emotional reactions

An individual's emotional reaction to new behaviours is the final influence of self-efficacy. A difficult task that may overwhelm an individual with low self-efficacy will be seen as a challenge by a person with high levels of self-efficacy. A study comparing two groups of women clearly demonstrates the impact of emotional reactions, in combination with thought patterns on breastfeeding performance. The first group of women were successful and content with their breastfeeding experience while the second group of women were discontent with their breastfeeding experience. As expected, the women in the first group were determined to succeed, problem solvers, positive thinkers, perceived difficulties as normal, and continued to breastfeed. The women in the second group concentrated on the negative aspects of breastfeeding, were self-doubting, nervous, inflexible in breastfeeding practices, and when confronted with any difficulties, were more likely to discontinue breastfeeding.[142]

High levels of breastfeeding self-efficacy lead to higher levels of initiating, performing and maintaining breastfeeding. Breastfeeding self-efficacy is a modifiable risk factor that has been found to successfully predict maternal confidence and thus future behaviours related to breastfeeding patterns.

1.7 BREASTFEEDING SELF-EFFICACY SCALES

1.7.1 Breastfeeding Self-Efficacy Scale

Bandura argues that it would be inadequate to measure general self-efficacy in the overall ability to assess an individual's efficacy in handling tasks associated with a specific behaviour, and therefore advocated a behaviour-specific approach in the study of self-efficacy.[142]

In order to conceptualise breastfeeding self-efficacy, a tool specific to tasks associated with breastfeeding had to be used. In 1999, Dennis created the breastfeeding self-efficacy scale (BSES) which was found to be a valid and reliable tool in predicting premature cessation of breastfeeding due to low maternal confidence.[132] The BSES items were derived from empirical literature on events that led to both the success and the premature discontinuation of breastfeeding.[142]

The original BSES is a self-report tool developed to measure breastfeeding confidence. There are 33 items on the original questionnaire, which are preceded by "I can always" and are measured on a Likert scale from 1 to 5 where 1 indicates "not confident at all" and 5 indicates "always confident". As recommended by Bandura, the scores should always be presented positively and, when added up, produce a range from 33 to 165.[141] The higher the score, the higher the mother's breastfeeding self-efficacy is said to be.[142]

Cronbach's alpha coefficient (internal consistency) was considered when evaluating the reliability of the BSES as well as a corrected item-total correlation coefficient and the alpha estimate when an item was dropped from the scale. In previous studies, the scale was administered postnatally, at one week and at four months and Cronbach's alpha coefficient was found to be 0.97, 0.96 and 0.96[132] respectively, which was well above the desired criteria of 0.70 for new tools. All corrected item-total correlations were positive and the coefficient alpha did not increase by more than 0.10 if any items were deleted.[132]

Content validity and pilot testing originally guided the development of the tool and the BSES was assessed for construct validity using three methods: factor analysis, comparison of contrasted groups, and correlations with measures of theoretically related constructs.[142] Principal components factor analysis yielded two subscales: breastfeeding technique and intrapersonal thoughts. Predictive validity was evaluated by determining the relationship between BSES scores and breastfeeding exclusivity and duration before, during and after

the use of the tool.[142] The BSES was found to be a reliable and valid tool, significantly related to breastfeeding duration and level.[141]

1.7.2 Studies Supporting the use of BSES

The BSES was psychometrically tested by Dennis and Faux in a convenience sample of 130 Canadian mothers,[142] who identified a significant relationship between BSES scores in the immediate postpartum period and breastfeeding outcomes at six weeks.[142] Further methodological studies were conducted in Australia[112,132,157], China[158], and Puerto Rico.[159] These studies illustrate that breastfeeding self-efficacy in the early postpartum period consistently predicted breastfeeding duration at four, eight, and sixteen weeks postpartum. In addition to predicting duration, breastfeeding self-efficacy has also consistently been associated with exclusivity of breastfeeding.[132,157–159]

1.7.3 Breastfeeding Self-Efficacy Scale-Short-Form (BSES-SF)

The original BSES yielded a consistently high Cronbach's alpha coefficient, multiple factor loadings and, due to its length, would not be easy or practical to administer in a clinical setting, thus indicating that item reduction would be beneficial.[141]

Cronbach's alpha coefficient was again evaluated to determine reliability for the BSES-SF and was found to be 0.94,[141] showing increased internal consistency. The sum of BSES-SF significantly correlated with the respective original BSES scores at one, four and eight weeks postpartum. Based on the encouraging reliability analysis, a validity assessment was conducted and the sum BSES-SF was also found to be a reliable and valid tool to predict breastfeeding outcomes.[141]

Thus, the BSES was condensed to the BSES-SF, a 14-item questionnaire which was presented and interpreted in the same way as the original form, and when added up produces a range from 14 to 70.[141]

1.7.4 Studies Supporting the use of BSES-SF

The BSES-SF was psychometrically tested in a group of 491 Canadian mothers by Dennis[141] and further methodological studies were conducted in Poland,[160] the United Kingdom,[161] and the United States,[137] which all confirmed that the BSES-SF has sound psychometric properties and can be used in diverse groups of mothers. The BSES-SF is a

unique tool to identify mothers at high risk of premature cessation of breastfeeding, based on modifiable variables as there was a lack of association between BSES-SF scores and maternal demographic factors such as age, marital status, education and income.[141] The shortened tool was found to be ready for clinical use to reliably identify mothers who are unlikely to succeed and will require additional intervention to ensure success.[141]

1.8 MOTIVATION FOR THE INVESTIGATION

Successful and sustained breastfeeding contributes to a healthier, better-educated, more equitable and more environmentally-sustainable world.[13] The BSES-SF is a unique tool that does not put additional strain on healthcare workers as it can be used with ease at minimal cost and within time constraints, to recognise mothers who are at high risk of premature cessation of breastfeeding due to low levels of maternal confidence.[141] It is vital in a resource-limited setting such as South Africa, that interventions be aimed at those who will reap the maximum benefit. Therefore, once at-risk mothers are identified, healthcare workers can focus their efforts and resources on uplifting these mothers to improve breastfeeding outcome. If this study proves that BFSES-SF scores positively predict the duration of exclusive breastfeeding up to and including six months of age, those who are identified as high risk for premature cessation of exclusive breastfeeding can receive appropriate breastfeeding support. The before and after scores of such interventions can be assessed to test their effectiveness at improving maternal self-efficacy.[137]

The outcome of improved breastfeeding rates would be far reaching, impacting maternal and infant long- and short-term health, decreasing unnecessary maternal and infant deaths, decreasing HIV rates, generating substantial cost savings with regard to health care, and reducing the economic burden due to lower IQ levels as a result of ineffective breastfeeding practices.

Although the BSES-SF has been tested and validated across the world, no studies linking breastfeeding self-efficacy and duration of exclusive breastfeeding have been conducted in South Africa. Therefore, this study provides an opportunity to explore this interesting concept in the diverse and uniquely South African context, specifically focusing on the additional high burden of HIV infections faced in the country.

CHAPTER 2: METHODOLOGY

2.1 RESEARCH QUESTION

Does a relationship exist between breastfeeding self-efficacy and the duration of exclusive breastfeeding in HIV-infected and HIV-uninfected mothers?

2.2 RESEARCH QUESTION AND OBJECTIVES

2.2.1 Research Question

To determine if a relationship exists between breastfeeding self-efficacy (determined using the sum of the BSES-SF scores) and the duration of exclusive of breastfeeding in HIV-infected and HIV-uninfected mothers.

2.2.2 Objectives

i. To determine if a high BFSES-SF score is predictive of an increased duration of exclusive breastfeeding in the study population.
ii. To determine if there is difference in BSES-SF scores between mothers who are HIV-infected and mothers who are HIV-uninfected.
iii. To determine if there is difference in the exclusivity of breastfeeding between HIV-infected and HIV-uninfected mothers.
iv. To describe additional factors that could affect a mother's breastfeeding self-efficacy and thus BSES-SF scores.

2.3 HYPOTHESES

i. A high BSES-SF score is not predictive of an increased duration of exclusive breastfeeding.
ii. There is no difference in BSES-SF scores between mothers who are HIV-infected and mothers who are HIV-uninfected.
iii. There is no difference in the duration of exclusive breastfeeding between HIV-infected and HIV-uninfected mothers.

2.4 STUDY TYPE

A descriptive analytical cohort study was performed where mothers were recruited postpartum and followed up with monthly telephone calls.

A cohort study design was chosen, as the goal of this study was to determine a possible relationship between an exposure (sum of BSES-SF scores) and an outcome (duration of exclusive breastfeeding).

2.5 STUDY SITE

The study site was the Rahima Moosa Mother and Child hospital which is located in Coronationville, Johannesburg, Gauteng.

2.6 STUDY POPULATION

The study population consisted of mothers who gave birth at the Rahima Moosa Mother and Child hospital postnatal wards during the period August 2014 to May 2015, who met the inclusion criteria.

2.7 SAMPLE SIZE

Every month at Rahima Moosa Mother and Child Hospital, there are approximately 1000 live births to mothers over 18 years of age. Of these live births, approximately 14% are born prematurely (birth weight less than 2500g), 60–70% are born by normal vaginal delivery and 30–40% are born by Caesarean section. The average percentage of infants born to HIV-infected women in the three months preceding the pilot study was 16.6%. These statistics

mirror the 2015 Stats SA Mid-year population estimates, which reveal that approximately one fifth (18.99%) of women of childbearing age (15–49) are HIV-infected.[162]

A power analysis for comparing the two main categorical groups (HIV-infected and HIV-uninfected) with Analysis of Variance showed that a sample of size $n = 170$ was needed for each of the two groups (HIV-infected $n = 170$ and HIV-uninfected $n = 170$) to yield 90% power to detect an effect size of 0.25 with a significance level $\alpha = 5\%$. Therefore, a total sample size of 340 mothers was needed for analysis. Based on previous studies of a similar nature, an attrition rate of 20% was expected.[137,160,161] Therefore, $n = 410$ mothers were originally needed (HIV-infected $n = 205$ and HIV-uninfected $n = 205$) to ensure that at least 340 mothers were included in the final analysis. After data was collected from 289 mothers, an interim analysis was conducted and this sample size was found to yield sufficient power to stop the data collection. A power of >90% with a significance level of $p =< 0.05$ was attained.

2.8 SAMPLE SELECTION

Every mother who gave birth at the hospital during the allocated time period had a chance to participate in the study. A daily birthing list was obtained from the labour ward and every mother on the list was screened for eligibility. A simple one-page screening tool (developed by the researcher) in the form of a Yes/No questionnaire indicating the inclusion and exclusion criteria helped to determine eligibility of the mothers (Appendix A). Data pertaining to possible birth defects that could have affected feeding practices (e.g. cleft palate) and the mother's medical condition (if she required specialised or long term care) was collected from the medical files. If the mother was eligible, she was not excluded from the study if her infant was being mixed-fed in the hospital setting. Eligible mothers were asked to complete an informed consent form and were interviewed by the researcher. All willing and eligible mothers who were available during the researcher's working hours were included in the final sample using convenience sampling.

2.8.1 Inclusion Criteria

1) Expressed intent to exclusively breastfeed her infant
2) Was 18 years or older
3) Gave birth to a full term infant (≥37 weeks gestation)
4) Able to understand spoken English, Afrikaans or Zulu
5) Had access to a cellular or landline telephone
6) Had given informed consent
7) Lives in South Africa regardless of citizenship

2.8.2 Exclusion Criteria

1) Infants who required specialised or long term care, e.g. admitted to the Neonatal Intensive Care Unit.
2) Infants with known birth defects that affected feeding practices, e.g. cleft palate.
3) Mothers who required specialised or long term care, e.g. diabetics, Intensive Care Unit patients.

2.9 STUDY PROCEDURES

The baseline data was collected at the Rahima Moosa Mother and Child Hospital postnatal wards. The researcher (Abigail Courtenay) collected this data using a data collection form (Appendix B). A Zulu translator was available if any of the mothers could not understand English or Afrikaans. After discharge, mothers were contacted telephonically on a monthly basis using one of two set telephonic interview questionnaires (Appendix C) to determine breastfeeding status. Mothers were exited from the study if they indicated during the telephonic interview that they were no longer exclusively breastfeeding or when the child turned six months old, whichever occurred first.

Each potential mother was initially assessed for eligibility based on information provided on the birthing list using the initial screening tool. Mothers were approached within six hours after a normal vaginal delivery and within 2–3 days after a Caesarean section. There are no set times for patient discharge; therefore mothers were recruited on a daily basis. After the interview, mothers received a copy of the informed consent form on which their follow-up date reminder was printed.

Informed consent was obtained using the informed consent form (Appendix D) which was approved by the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Stellenbosch University. All data collection procedures were explained in detail to each mother by the researcher prior to their signing the informed consent form.

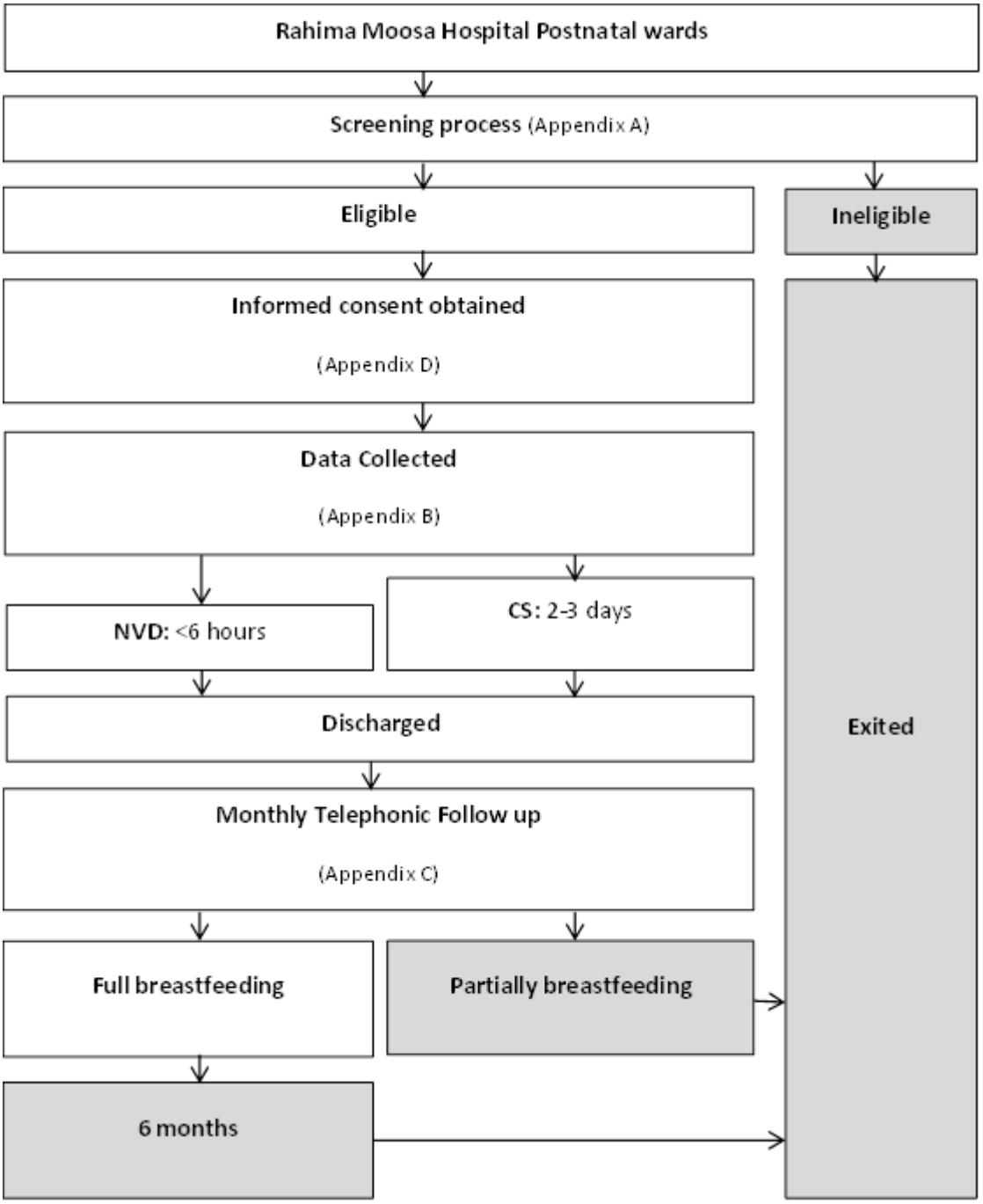

Figure 1: Flow diagram of study procedure

2.10 METHODOLOGY: MEASUREMENTS, METHODS AND INSTRUMENTS

2.10.1 Participant Information

Once informed consent was obtained, the mother was interviewed by the researcher using a pre-set data collection form (Appendix B), which related to relevant demographic, medical and breastfeeding information.

2.10.2 Pain Scale

A mother's physiological state (her perception of pain, fatigue and anxiety) has been shown to play a major role in her expectations of her ability to breastfeed successfully.[142] In this study, pain was assessed using the Wong-Baker FACES® (WBF) Pain Rating Scale[163] which was included in the data collection form (Appendix B). Theoretically, the higher her WBF® Pain Rating Scale, the lower her BSES-SF score was expected to be.[142]

2.10.2.1 The Wong-Baker FACES® pain rating scale[163]

A popular method to measure acute, procedural and recurrent pain intensity is to use face pain scales. They are easy to use and have been found to be less abstract than the visual analogue and numerical scales. Even though they are most commonly used in children, they have also been used in older individuals.[164] The faces on the WBF® Pain Rating Scale are used to depict the degree of pain that the individual is experiencing. The mother was asked to choose from the six faces the one that best depicts the pain she was experiencing. Face 0: doesn't hurt at all; Face 2: hurts just a little bit; Face 4: hurts a little bit more; Face 6: hurts even more; Face 8: hurts a whole lot; Face 10: hurts as much as one can imagine, although the mother does not have to be crying to have this worst pain (Appendix B).[163] Due to its simplicity and ease of use, the WBF® Pain Rating Scale was appropriate in this study as the educational level of the study mothers varied and time was limited. As pain is subjective, the higher the mother's score, the worse her perceived pain was and the lower her BSES-SF score was expected to be.

2.10.3 BSES-SF Questionnaire

There were 14 items on the BSES-SF which were preceded by "I can always" and were measured on a Likert scale from 1 to 5 where 1 indicates "not confident at all" and 5 indicates "always confident".[141] A visual aid was used to assist mothers in visualising their

confidence levels (Appendix E). The total score (ranging from the lowest score of 14 to the highest score of 70) was always presented positively, as recommended by Bandura. The higher the mother scored, the higher her breastfeeding confidence.[141]

2.10.4 Telephonic Data Collection Procedure

Once the researcher had completed the initial interview with the mother, the informed consent form on which a telephonic appointment reminder was printed was issued to the mother, reminding her on which day to expect the first telephonic follow-up appointment. Mothers were contacted on the Monday, Wednesday or Friday closest to a month after their initial interview. To increase the chances that the mother would answer the researcher's phone calls, she was given the choice as to whether she would prefer to be called in the afternoon or the evening.

After discharge from the postnatal wards, the mothers were contacted by the researcher telephonically on a monthly basis to assess the duration of exclusive breastfeeding using one of two set telephonic interview questionnaires, to prevent the mothers from giving a learned response. The two questionnaires, which were developed to assess breastfeeding exclusivity on a monthly basis, asked the same questions but used different wording. The first questionnaire was issued at months 1, 3 and 5 and the second questionnaire was issued at months 2, 4 and 6.

To minimize loss of contact for follow up, the mothers were asked to provide an alternate telephone number of someone who lives with or near to them (in addition to their primary number). The researcher called the alternate number if the mother did not answer her phone on the set date and time, after three attempts. If the mother could not be reached for three consecutive days, she was regarded as being lost to follow up. An SMS was sent to the mothers on the morning that the follow up took place, reminding them to answer their phones when the researcher called.

The duration of exclusive breastfeeding was measured from birth until the mother reported that she had introduced something other than breast milk (i.e. mixed feeding or partial breastfeeding) or when the infant turned six months old, whichever occurred first. The

following classifications for breastfeeding were used during data analysis: Exclusive breastfeeding; predominant breastfeeding; full breastfeeding and partial breastfeeding.[165]

The mothers were asked to indicate the reason for mixed feeding or partial breastfeeding if applicable. Mothers, who were found to no longer be exclusively breastfeeding on follow up, were exited from the study. Upon being exited, the researcher educated them telephonically on the advantages of exclusive breastfeeding and, more importantly, any related risks of stopping exclusive breastfeeding. The mothers were educated using standardised discussion points and were referred to their local clinics if they needed additional counselling or information. The above information was recorded together with date of exit from the study (Appendix C).

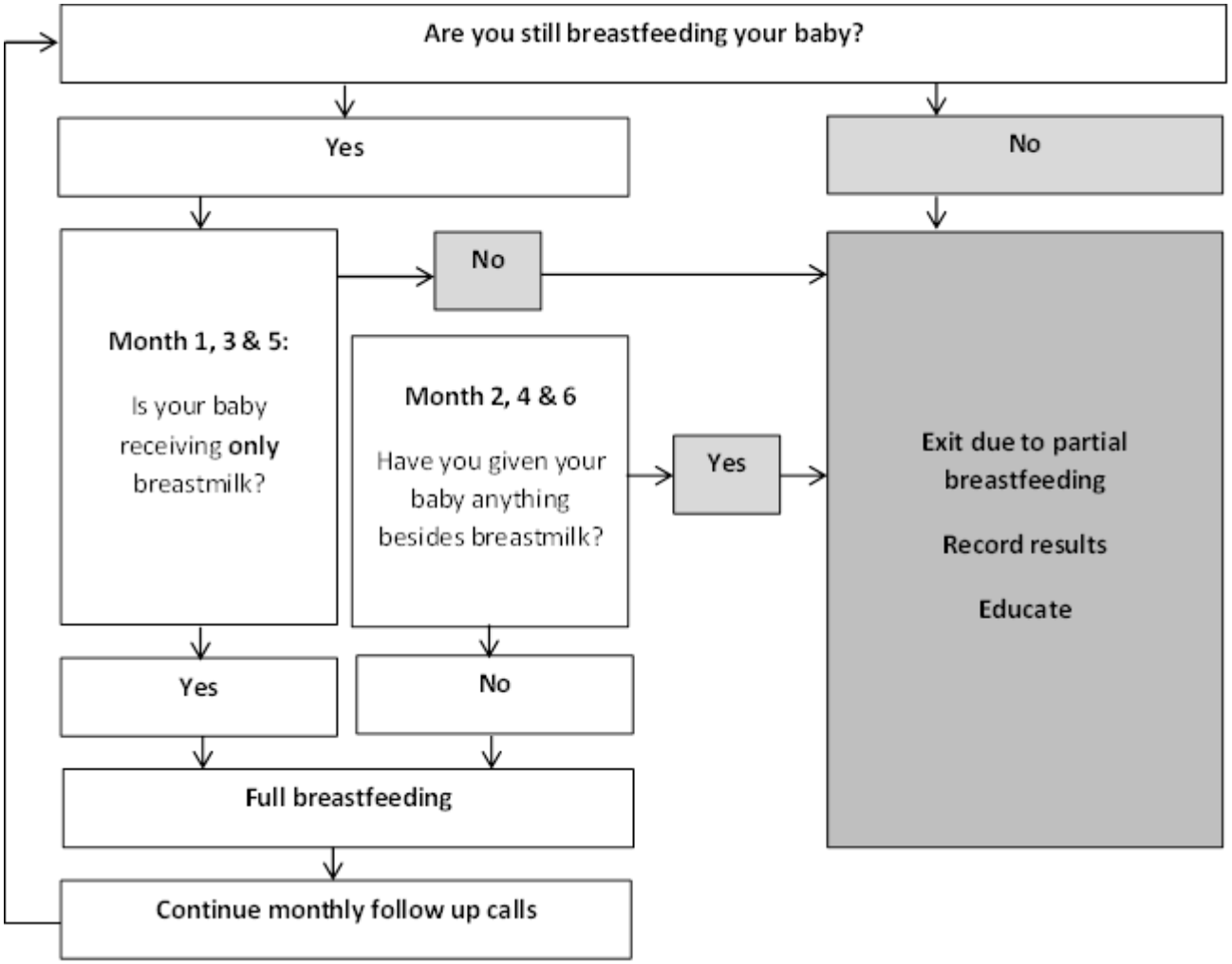

Figure 2: Telephone questionnaire decision tree

2.10.5 Reliability and Validity

To ensure reliability of all questionnaires (excluding the Wong-Baker FACES® pain rating scale and the BSES-SF, as those scores are expected to change depending on when the mother was tested), one in every 50 mothers was tested twice by the same researcher at different times of the day (test-retest reliability) and by a different researcher (inter-observer reliability) at different times in the day. If these results differed from one another, relevant information was double checked in the mother's hospital file or if the information was not available in the file, the mother was asked to verify the correct information.

All questionnaires were translated into Afrikaans and Zulu, after which they were translated back into English to ensure that the meaning of each question remained the same. This ensured the validity and reliability of the translated questionnaires.

2.10.5.1 The BSES-SF

The internal consistency reliability of this tool using Cronbach's alpha was reported to be 0.94 with a scale mean of 55.88 ($SD = 10.85$).[141] This indicated a high internal consistency (>0.9) and so we could assume that all the items on the list were a variation of the same skill, i.e. breastfeeding self-efficacy, even when translated into different languages. It was also found to have high predictive validity in measuring breastfeeding self-efficacy.[137,141,160,161]

Predictive validity was assessed on completion of the study by comparing BSES-SF scores to actual duration of exclusive breastfeeding, and a pilot study was conducted to assess face validity.

2.10.5.2 The Wong-Baker FACES® pain rating scale

The WBF® Pain Rating Scale was validated, mainly in children but also in older individuals, by demonstrating significant correlations with similar tools such as the adapted Visual Analogue Scale.[164,166]

2.11 ANALYSIS OF DATA

2.11.1 Baseline Data Collection

The variables collected during this study were presented using summary statistics.

2.11.2 Data Collection Form

Demographic, medical and breastfeeding information was summarised by the number and percentage of study subjects classified into a given category. The WBF® Pain Rating Scale was interpreted using the mean as the measure of central tendency and standard deviation as an indication of spread.

Once final data collection had taken place (month six), this information was statistically analysed to determine if there was a significant relationship between the mothers' demographic, medical and breastfeeding information variables and the sum of their BSES-SF scores. If the variable had a significant relationship with the outcome, it was entered into the regression model for further analysis.[167]

2.11.3 BSES-SF

The sum of all 14 items of the BSES-SF scores were interpreted using the median as the measure of central tendency and interquartile ranges as an indication of spread.[167]

2.11.4 Monthly Telephonic Interviews

Mothers were exited from the study as soon as they stopped breastfeeding exclusively. Once the mother was exited from the study, the sum of her original BSES-SF scores were compared to the actual duration of exclusive breastfeeding to determine correlation and thus predictive validity, as well as to determine variables found to be significant during the data collection analysis.

2.12 DATA CAPTURING

The data collected was recorded manually by the researcher on paper during the interview and then transferred into a Microsoft Excel 2013 spread sheet once a week.

2.13 STATISTICAL ANALYSIS

Statistical analysis was done with the assistance of Tygerberg Biostatistics Unit, Stellenbosch University using The Statistical Package for Social Sciences Software (SPSS) version 22.0 to analyse the data.

The demographic characteristics of the mothers were presented using descriptive statistics. Non-parametric tests were used as the sample was not normally distributed and thus Spearman's correlation coefficient was used to show correlation. Significance was tested using Mann Whitney, Kruskal Wallis, Pearson's chi-squared and Fischer's exact tests. A Bonferroni correction was performed when multiple comparisons were made and a logistic regression was used to determine the independent predictors of increased duration of exclusive breastfeeding. Risk ratios were calculated to determine how much more likely a mother is to have early cessation and decreased duration of breastfeeding based on the sum of her BSES-SF scores. A p-value of $p < 0.05$ represents a statistical significance in hypothesis testing and 95% confidence intervals.

2.14 PILOT STUDY

After ethical approval was obtained, a pilot study was conducted within the sample population to assess face validity. Forty one mothers (10% of the original sample size) were recruited for the pilot study and the results were used to ensure that the data collection questionnaire (including the WBF® Pain Rating Scale) and BSES-SF had acceptable readability and comprehension in their existing format and to determine the time it would take for each interview. Mothers were then telephoned at the first month appointment to ensure that the data collection procedure surrounding the telephonic interview questionnaire and exit discussion points was appropriate. The mothers included in the pilot study did not form part of the final sample study, rather this information was used to determine if the data collection questionnaire, BSES-SF, telephonic interview or exit discussion points were well understood by the mothers, if not, changes were made accordingly. Data collection commenced after minor adjustments were made.

2.15 FINANCIAL DISCLOSURE

The investigation received funding from the Fund for Innovation and Research in Rural Health (FIRRH), administered by the Stellenbosch University.

2.16 ETHICAL AND LEGAL ASPECTS

The study was approved by the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Stellenbosch University (S13/10/195). Institutional approval was granted by the Department of Health (P041113) and Rahima Moosa Mother and Child Hospital to allow the researcher to have access to the mothers' hospital files during admission.

All mothers involved in the study received an informed consent form that was explained to them in detail by the researcher before they signed. Two copies of the informed consent form were signed. The study mother received one original signed copy and one original signed copy has been kept in the possession of the researcher.

The informed consent forms have been coded. Each mother was allocated a unique code that was used in the data collection and analysis phase, ensuring that all information collected was handled in an anonymous and confidential manner. The mother's HIV status as well as current treatment was retrieved from her hospital file (and confirmed during the interview). This information was also coded so as to prevent disclosure of the mother's HIV status to any outside parties.

After mothers were exited from the study, it was an ethical imperative to provide them with education on the problems associated with mixed feeding in an unbiased way so that they could make an informed decision about whether they wished to stop breastfeeding completely.

2.17 REPORT

The results of this study will be published in article format by the researcher (Abigail Courtenay) in a reputable journal.

CHAPTER 3: RESULTS

The results section is reported in an article format. A degree of unavoidable overlap has occurred between the previous chapter and the following article. The article will be submitted for publication to relevant peer reviewed journals.

3.1 ARTICLE 1

Breastfeeding self-efficacy and the duration of exclusive breastfeeding in HIV-infected and uninfected mothers

Breastfeeding self-efficacy and the duration of exclusive breastfeeding in HIV-infected and uninfected mothers

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ABSTRACT

Background: Breastfeeding self-efficacy, measured using the Breastfeeding Self-Efficacy Scale Short-Form (BSES-SF), is a modifiable risk factor for breastfeeding outcomes. The BSES-SF is a valid and reliable tool used to predict a decrease in exclusivity and duration of breastfeeding in a diverse population of mothers.

Objectives: To determine if a relationship exists between breastfeeding self-efficacy (determined using the sum of the BSES-SF scores) and the duration of exclusive of breastfeeding in HIV-infected and HIV-uninfected mothers. In addition to this the difference in exclusive breastfeeding between HIV-infected and HIV-uninfected will be assessed together with additional factors that could affect a mother's breastfeeding self-efficacy and thus BSES-SF scores.

Participants and Methods: A descriptive analytical cohort study was conducted, with the primary outcome being the duration of exclusive breastfeeding up to six months postpartum. The study sample comprised 329 women who had given birth at the Rahima Moosa Mother and Child Hospital in Coronationville, during the period August 2014 to May 2015, who were interviewed during their hospital stay using self-formulated questionnaires including the BSES-SF. Post hospital follow-up was done telephonically.

Results: The BSES-SF scores were a positive predictor of the duration of exclusive breastfeeding in both HIV-infected and uninfected mothers. The BSES-SF scores were found to be an independent predictor of an increased duration of exclusive breastfeeding. Other independent predictors of breastfeeding included method of feeding in hospital, prenatal intention to breastfeed and race.

Conclusion: The BSES-SF has been confirmed by our study as a valuable instrument for identifying women at risk of early cessation of exclusive breastfeeding. Together with other demographic, medical and breastfeeding factors, the instrument could be useful in directing limited resources to those most in need of breastfeeding support.

Introduction

The short-[8,10–13,15–24,168] and long-term[1,5,25–28,30,31] benefits of exclusive breastfeeding are well established in the literature, and current breastfeeding recommendations advocate exclusive breastfeeding[i] for the first six months of life, regardless of HIV status.[1,6,43,44]However, exclusive breastfeeding rates in South Africa remain dismal. [58,59] In order to address low adherence to breastfeeding recommendations, the key determinants associated with breastfeeding must be understood.

Reasons for avoidance or early cessation of breastfeeding can be attributed to numerous medical, cultural, and psychological factors, to physical discomfort and/or inconvenience.[62] The key determinants that affect optimal breastfeeding practices include (but are not limited to): health systems and services; industry and marketing; workplace and employment, attitudes of the community and family and finally the mother-infant dyad. Many factors that influence breastfeeding duration and exclusivity are non-modifiable (such as race, parity, mode of delivery), but one factor that has been found to be both modifiable and amenable to intervention is breastfeeding self-efficacy.[112,145]

The self-efficacy theory[142] originated from Bandura's social learning theory[152] and can be described as a cognitive process of an individual's confidence in their perceived ability to regulate their motivation, emotional states, thought processes and social environment in performing a specific behaviour.[152] To conceptualise breastfeeding confidence, Dennis[169] developed the breastfeeding self-efficacy theory (Figure 1) was developed and, subsequently, the Breastfeeding Self-Efficacy Scale (BSES),[142] and later the Breastfeeding Self-Efficacy Scale Short-Form (BSES-SF)[141] were developed and found to be valid and reliable tools in predicting premature cessation of breastfeeding due to low maternal confidence.[112,132,137,157–161]

[i]Exclusive breastfeeding: An infant receives only breast milk and no other liquids or solids, not even water, with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines.

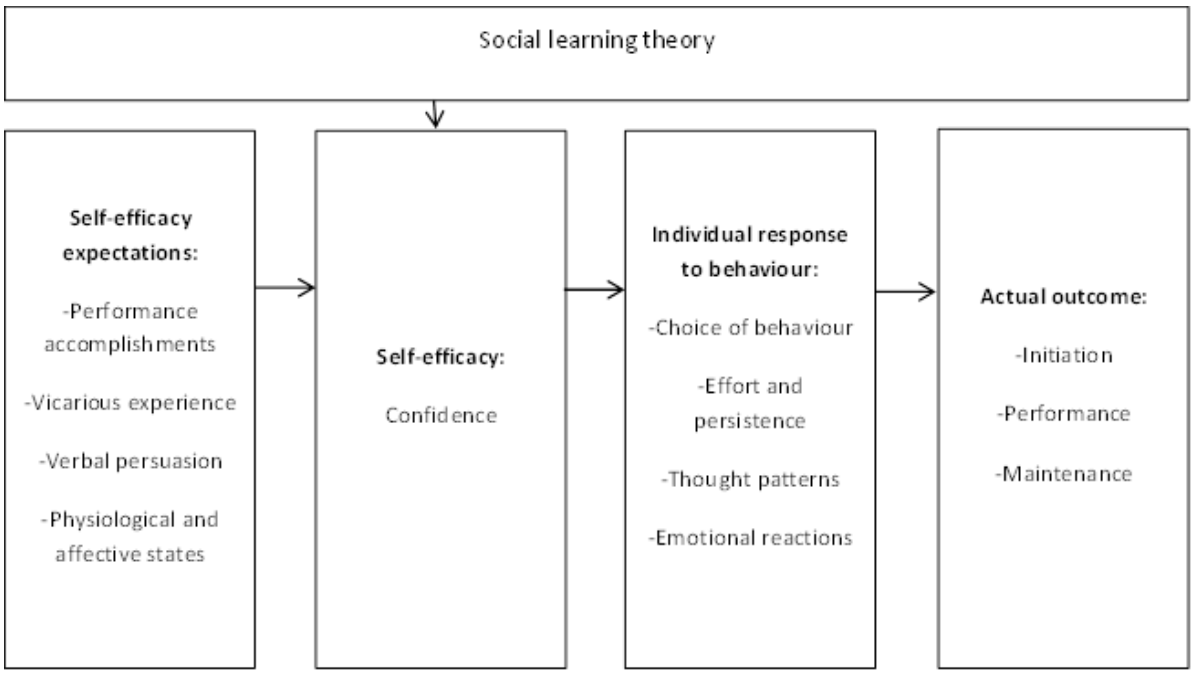


Figure 1: Self-efficacy framework

Adapted from Dennis 1999[169]

A mother's physiological state (her perception of pain, fatigue and anxiety) has been shown to play a major role in her expectations of her ability to breastfeed successfully.[142] In this study, pain was assessed using the Wong-Baker FACES® (WBF) Pain Rating Scale[163] which was included in the data collection form. Theoretically, the higher her WBF® Pain Rating Scale, the lower her BSES-SF score was expected to be.[142]

Research linking breastfeeding self-efficacy and duration of exclusive breastfeeding has not been conducted in South Africa and no known studies have examined the association between breastfeeding self-efficacy and mothers infected with the human immunodeficiency virus (HIV). This study aims to prove a positive association between BSES-SF scores and the duration of exclusive breastfeeding, in HIV-infected and HIV-uninfected mothers, up to six months of age.

Methodology

A descriptive analytical cohort study was conducted at the Rahima Moosa Mother and Child Hospital, South Africa to determine if a relationship exists between BSES-SF scores and duration of exclusive breastfeeding in HIV-infected and HIV-uninfected mothers.

Mothers were recruited between August 2014 and May 2015 from the postnatal ward and were followed up telephonically for a period of six months. Mothers were exited from the study when they were no longer practising full breastfeeding[ii] or when their infant turned six months old, (whichever occurred first).

A mother was eligible to participate in the study if she (1) intended to exclusively breastfeed her infant, (2) was 18 years or older, (3) gave birth to a full-term infant (≥37 weeks gestation), (4) was able to understand spoken English, Afrikaans or Zulu, (5) had access to a cellular/land line telephone, (6) had given informed consent and (7) lived in South Africa regardless of citizenship.

Information obtained during the initial interview included relevant demographic, medical and breastfeeding information, perception of pain (using the Wong-Baker FACES® Pain Rating Scale) and BSES-SF scores. This information was collected using information found in the patient's hospital files as well as questionnaires conducted by the researcher. To ensure reliability for all questionnaires, test-retest reliability and inter-observer reliability tests were performed and face validity was assessed by conducting a pilot study with 41 mothers.

The total BSES-SF score ranged from the lowest score being 14 to the highest score being 70. To date, no validated studies are available that groups the BSES-SF scores into categories, thus in order to compare scores it must be noted that a higher score was indicative of a higher maternal breastfeeding confidence.[141] In previous studies, the BSES-SF questionnaire was found to have a high internal reliability (Cronbach's alpha $= 0.94$)[141] as well as a high predictive validity in measuring breastfeeding self-efficacy. The faces on the Wong-Baker FACES® Pain Rating Scale were used to depict the degree of pain that the individual is experiencing from 0 (no pain at all) to 10 (worst pain).

[ii]Full Breastfeeding: This definition included both exclusive breastfeeding and predominant breastfeeding. [The infant's predominant source of nourishment has been breast milk. However, the infant may also have received water and water-based drinks (sweetened and flavoured water, teas, infusions etc.); fruit juice; oral rehydration salts solution; drop and syrup forms of vitamins, minerals and medicines; and ritual fluids (in limited quantities). With the exception of fruit juice and sugar-water, no food-based fluid is allowed under this definition].

A power analysis on >90% yielded a sample size of 298 mothers. Statistical analysis was performed using SPSS version 22.0.

Non-parametric tests were used as the sample was not normally distributed and thus Spearman's correlation co-efficient was used to show correlation. Significance was tested using Mann Whitney, Kruskal Wallis, Pearson's chi-squared and Fischer's exact tests. A Bonferroni correction was performed when multiple comparisons were made and a logistic regression was used to determine the independent predictors of increased duration of exclusive breastfeeding. Statistical significance was represented by a p-value of p=<0.05.

Ethical approval was granted by the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Stellenbosch University (S13/10/195), the Department of Health (P041113) and Rahima Moosa Hospital.

Results

Participant's Demographics

Of the 329 mothers who met the inclusion criteria $n = 31$; 9.4% were lost to follow up. The final study population consisted of $n = 298$ mothers of which $n = 107$; 35.9% were HIV-infected and $n = 191$; 64.1% were HIV-uninfected. The majority of the mothers were 18–35 years of age ($n = 260$; 87.2%), African ($n = 236$; 79.2%), had a high school education ($n = 219$; 73.5%) and were not married ($n = 195$; 65.4%) (Table 1). The details of the final sample are described below in Figure 1.

A total of $n = 151$; 50.7% mothers either ceased breastfeeding or were partially[iii] breastfeeding before six months postpartum. The main reasons for this were the perception of insufficient milk (PIM), returning to school/work and 'other'. Some of the reasons the mother's gave for early cessation of breastfeeding listed under 'other' includes: baby or mother currently admitted to hospital, bleeding or cracked nipples, baby was going 'home' to live separately from the mother, jaundice, mixed feeding in hospital, breast refusal, maternal choice and misinformation from the clinic.

Of the 38 "older" mothers (those who were older than 35 years), 36 (94.7%) had breastfed previous infants and of these, 32 (84.2%) found that breastfeeding experience rewarding.

[iii] Partial breastfeeding: A situation where the baby received some breastfeeds but was also being given other food or food-based fluids, such as formula milk or weaning foods.3

A descending trend for the reason "returning to work or school" (3 months: 43.5%, 4 months: 38.1% and 5 months: 16.0%) and an ascending trend for PIM (3 months: 39.1%, 4 months: 42.9% and 5 months: 72.0%) was observed in this population of mothers.

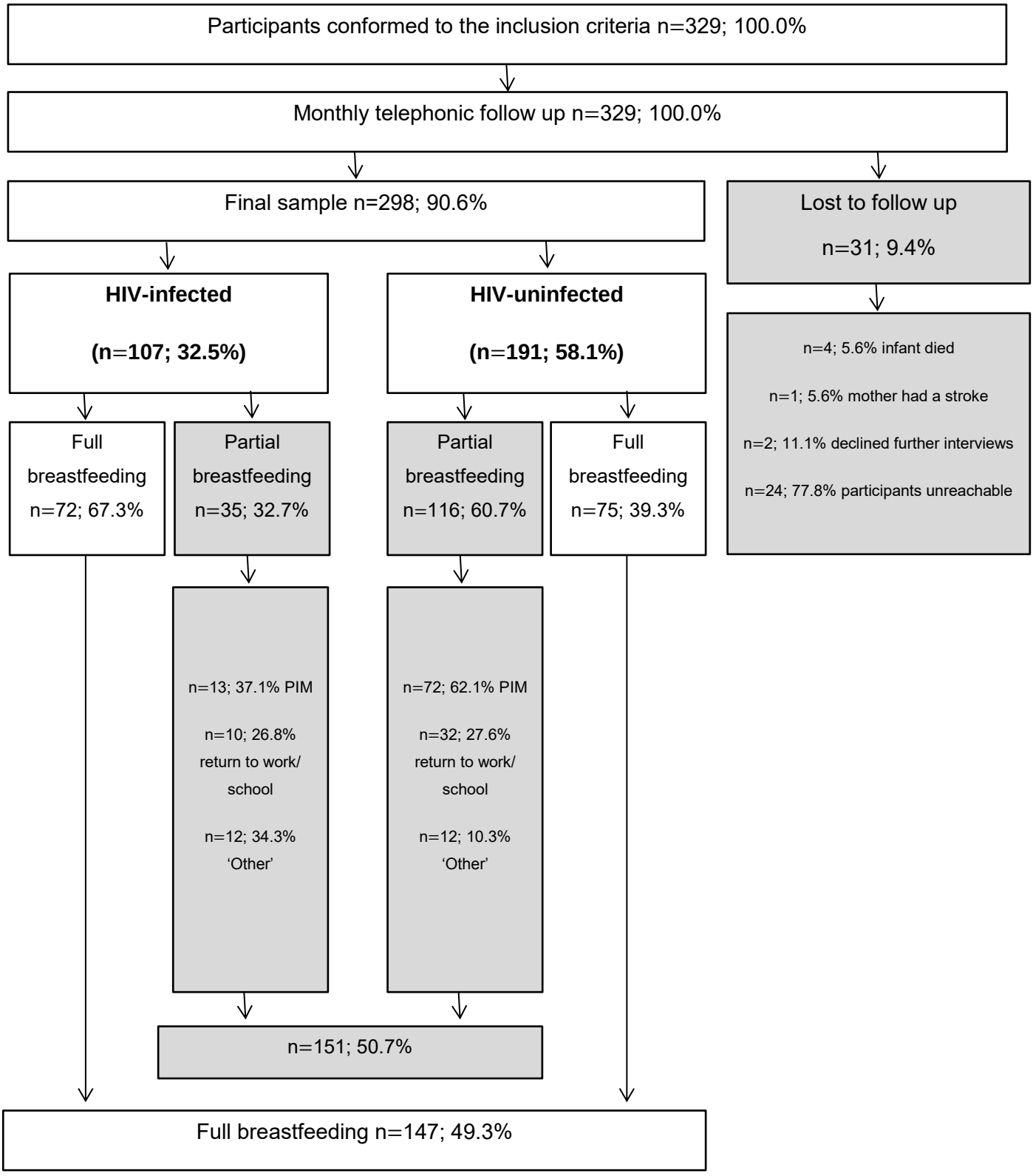


Figure 2: Mother recruitment and retention

Table 1: Demographic information of the sample population

		Total study population n; %	HIV-infected n; %	HIV-uninfected n; %
		n=298	**n=107**	**n=191**
Age	18 – 35 years	260; 87.2	83; 77.6	177; 92.7
	>35 years	38; 12.8	24; 22.4	14; 7.3
Race	African	236; 79.2	101; 94.4	135; 70.7
	White	13; 4.4	0; 0.0	13; 6.8
	Indian	4; 1.3	0; 0.0	4; 2.1
	Mixed race	45; 15.1	6; 5.6	39; 20.4
Education	None	1; 0.3	1; 0.9	0; 0.0
	Primary school	3; 1.0	1; 0.9	2; 1.0
	High school	219; 73.5	90; 84.1	129; 67.5
	Tertiary	75; 25.2	15; 14.0	60; 31.4
Home language	Zulu	62; 20.8	32; 29.9	30; 15.7
	Sotho	25; 8.4	8; 7.5	17; 14.1
	English	31; 10.4	1; 0.9	30; 45.5
	Afrikaans	33; 11.1	6; 5.6	27; 66.5
	Other*	147; 49.3	60; 56.1	87; 45.5
Marital status	Unmarried	195; 65.4	68; 63.6	127; 66.5
	Married	95; 31.9	33; 30.8	62; 32.5
	Divorced	6; 2.0	4; 3.7	2; 1.0
	Widowed	2; 0.7	2; 1.9	0; 0.0
Monthly Income	<R1500/m	53; 17.8	31; 29.0	22; 11.5
	R1501 - R3000/m	80; 26.8	35; 32.7	45; 23.6
	R3001 - R6000/m	53; 17.8	15; 14.0	38; 19.9
	>R6001/m	112; 37.6	26; 24.3	86; 45.0

*Other languages: Tswana, Xhosa, Sepedi, Venda, Tsonga, Swathi, Shona and Ndebele.

The majority of the HIV-infected mothers were on ARV treatment schedules ($n = 104$; 97.2%) and of these 32; 30.8% initiated their treatment prior to their pregnancies.

Table 2 indicates the duration of ARV treatment during pregnancy. Three mothers had not yet initiated ARV treatment at the time of the interviews.

Table 2: Duration of ARV treatment during pregnancy

	n; %
Initiated 0-3 months of the pregnancy	20; 27.8
Initiated 3-6 months of the pregnancy	21; 29.2
Initiated 6-final month of the pregnancy	31; 43.0

Of the HIV-infected mothers, fewer were educated at a tertiary level than at high school level (20.0% versus 41.0% respectively) and of those with tertiary education, more (60.0%) had a higher income when compared with the high school graduates.

In addition to this, a higher percentage of HIV-infected mothers compared with HIV-uninfected mothers had a definite intention to breastfeed (72.0% versus 49.2%), breastfed exclusively while in hospital (98.1% versus 84.8%) and were African (94.4% versus 70.7%).

BSES-SF scores and duration of exclusive breastfeeding

A significant correlation ($r = 0.315$; $p < 0.001$) was found between the sum of BSES-SF scores and breastfeeding duration (1-6 months). The median scores from months 1-6 were 54.5, 58.0, 63.5, 62.0, 60.0 and 63.0 respectively (Figure 2).

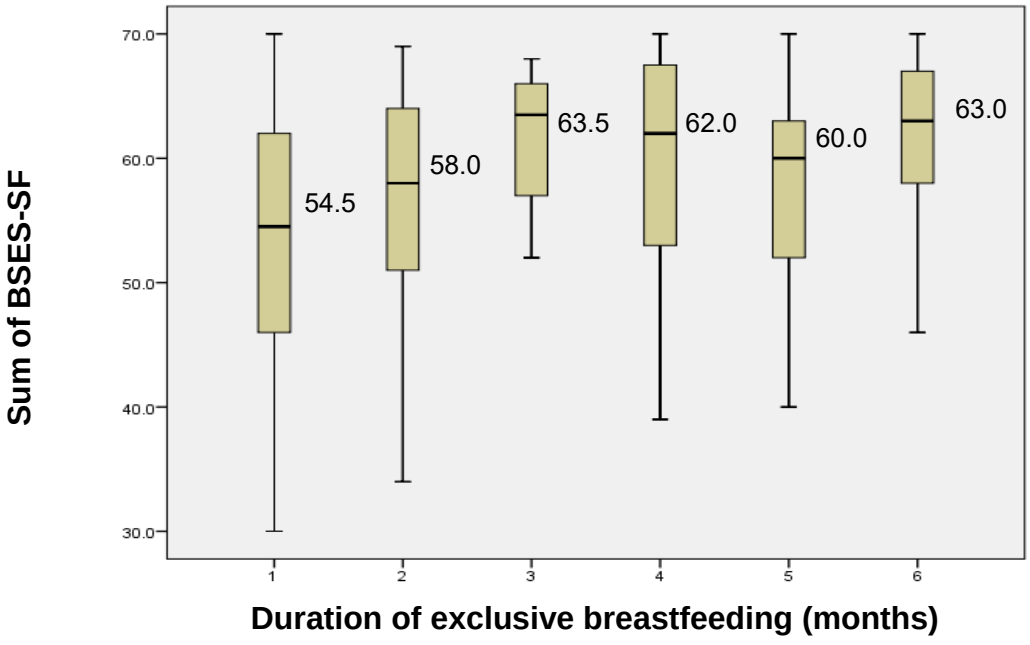


Figure 3: BSES-SF scores and duration of exclusive breastfeeding

For the purposes of this article, full breastfeeding duration was combined into groups of 1–2 months (low breastfeeding duration) and 3–6 months (high breastfeeding duration) which

will be referred to as Group 1 and Group 2 respectively. There was a significant difference ($p =< 0.001$) between the median sum of BSES-SF scores between Group 1 (sum of BSES-SF scores = 57.0) and Group 2 (sum of BSES-SF scores = 63.0).

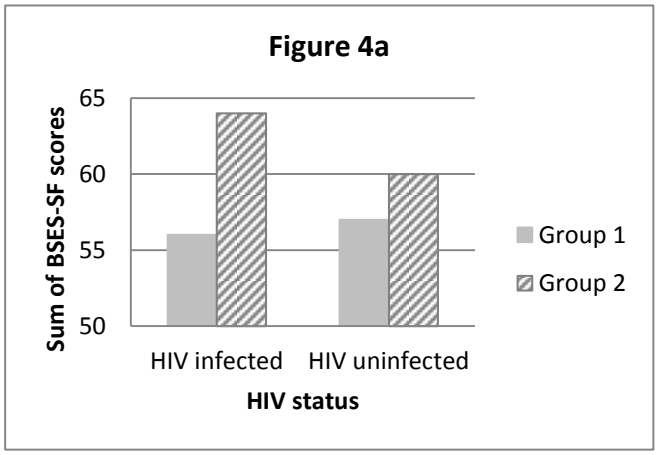
Sensitivity of individual BSES-SF questions

Whilst none of the individual BSES-SF questions are independent predictors of duration of exclusive breastfeeding, in totality (sum of BSES-SF scores) the tool is a highly significant predictor of exclusive breastfeeding duration. Of all the BSES-SF questions, two questions (I can always breastfeed my baby without using formula milk as a supplement and I can always manage to keep up with my baby's breastfeeding demands) were found to be significantly more sensitive ($p =< 0.001$) predictor for exclusive breastfeeding than any of the other questions.

HIV status, BSES-SF scores and duration of exclusive breastfeeding

When stratifying for HIV and breastfeeding duration it was found that the HIV-infected mothers breastfed for a significantly longer duration ($p =< 0.001$) [Group 1 ($n = 16$; 15.0%) and Group 2 ($n = 91$; 85.0%)] than HIV-uninfected mothers [Group 1 ($n = 67$; 35.1%) and Group 2 ($n = 124$; 64.9%)].

HIV-infected mothers also had a significantly higher sum ($p =< 0.001$) of the BSES-SF scores [Group 1 (56.0) and Group 2 (64.0)] than HIV-uninfected mothers [Group 1 (57.0) and Group 2 (60.0)] (Figures 4a and 4b).



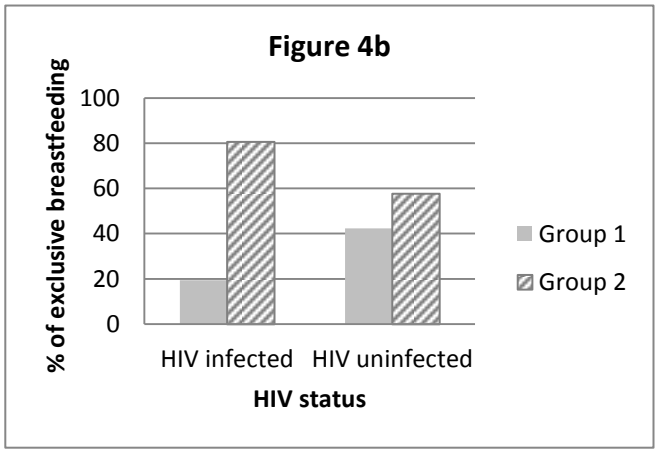


Figure 4a: Duration of exclusive breastfeeding and sum of BSES-SF score

Figure 4b: Duration of exclusive breastfeeding and HIV status

Relationships between study variables

The sum of BSES-SF scores were significantly affected by race, parity, HIV status, ARV treatment duration, intention to exclusively breastfeed for six months and breastfeeding experience ($p =< 0.001$) as well as maternal age and education, home language, monthly income, multiple gestation and method of feeding in the hospital ($p =< 0{,}05$) (Table 3 in supplementary material).

There was a significant difference between mothers who were on ARV treatment (irrespective of when it was initiated), who had a median sum of BSES-SF score of 64.0 and those not on ARV treatment, who had a median sum of BSES-SF score of 58.0.

The mothers who spoke Zulu/other had the highest scores followed by Sotho, Afrikaans and English respectively and all the mothers who spoke Zulu or Sotho were African and 72.7% of the mothers who spoke Afrikaans were mixed race.

Factors affecting duration of exclusive breastfeeding included intention to exclusively breastfeed for six months and method of feeding in hospital ($p =< 0.001$) and race, home language, monthly income, parity, HIV status, treatment, ARV treatment duration, CD4 count and support of a partner ($p =< 0.05$) (Table 4 in supplementary material).

The majority of the mothers ($n = 92$; 30.9%) said they experienced pain at the intensity of 'hurts a little bit' followed by 'hurts a little bit more' ($n = 67$; 22.5%), 'hurts even more' ($n = 58$; 19.5%), 'hurts a whole lot' ($n = 37$; 12.4%), no hurt ($n = 29$; 9.7%) with the minority of mother's indicating that the pain they experienced 'hurt worst' ($n = 15$; 5.0%).

The Wong-Baker FACES® Pain Rating Scale was not significantly associated with either the BSES-SF scores or the duration of exclusive breastfeeding.

Independent predictors of exclusive breastfeeding duration

A logistic regression was performed and the sum of BSES-SF scores, intention to exclusively breastfeed for six months, method of feeding in hospital and race were found to be independent predictors of increased duration of exclusive breastfeeding. The odds ratios for the sum of BSES-SF was 1.054, indicating that for every one unit increase in the BSES-SF score, the odds of that mother exclusively breastfeeding for a longer duration increase by 5.4%. Those with the intention to exclusively breastfeed for six months were almost three times more likely to exclusively breastfeed for a longer duration than those who said they "would try". Furthermore, exclusively breastfeeding while in hospital resulted in a 2.7 times increased likelihood of breastfeeding for a longer duration than those who mixed fed while in hospital. Lastly, the effect of race was pronounced as African women were 2.7 times and mixed race women were 1.5 times more likely to exclusively breastfeed for a longer duration than white/ Indian women.

Discussion

All the mothers in this study initiated breastfeeding while in hospital but in stark contrast to South Africa's National Statistics,[58] 44.7% of this sample maintained full breastfeeding for the first six months of their infant's life. Although this percentage is unusually high for the South African context, the reasons cited by those who had ceased breastfeeding or who had introduced some form of supplementation before six months mirror the reasons commonly given by mothers all around the world.

More than half (56.3%) of the mothers in this study who prematurely stopped exclusive breastfeeding had PIM or anxiety about their infant's hunger citing "not enough milk", "baby cries too much because he/she is hungry", "baby is too old to only receive milk" and "baby refuses the breast/milk has dried up". Whilst PIM may be a physiological response due to breastfeeding mismanagement,[151] it might also have been a psychological response manifesting from lack of breastfeeding confidence.[112,141,142,144,145]

The results of our study support the latter illustrating that breastfeeding confidence, measured using the Breastfeeding Self-Efficacy Scale Short-Form (BSES-SF),[141] was significantly associated with duration of exclusive breastfeeding. A mother's postnatal BSES-SF score was found to be an independent predictor of exclusive breastfeeding where a higher BSES-SF score related to a longer duration (3–6 months) of exclusive breastfeeding, while a lower score was related to a shorter duration (1–2 months). This finding was consistent with multiple studies from around the world[137,141,160,161] which identified a significant relationship between breastfeeding self-efficacy in the postpartum period and later breastfeeding outcomes.

Interestingly, in this study, the sum of BSES-SF scores were similar between the mothers in the prolonged breastfeeding group (month 3: 63.5, month 4: 62.0, month 5: 60.0 and month 6: 63.0). This indicates that although a mother might have had high breastfeeding self-efficacy, after three months there were other factors influencing her decision to introduce supplementary feeds. The two main reasons cited by mothers for cessation of exclusive breastfeeding were returning to work or school and PIM.

A descending trend was observed for the reason "returning to work/school". This was to be expected as returning to work has been noted as a well-known risk factor for early cessation of breastfeeding.[1,170] The South African Department of Labour[104] states that a mother is allowed four months maternity leave starting one month before her due date, thus falling around the three month mark. Many women are not aware of their rights[13] especially with respect to breastfeeding or breast milk expression breaks once they are back at work (a breastfeeding mother is allowed two 30-minute breaks in the day for the first six months of her infant's life[104]) and their working environment may not have any or may have inadequate facilities for expressing and safe storage of her breast milk.[99] An additional explanation for exclusive breastfeeding cessation at three months is that it coincides with a growth spurt. During a growth spurt, the infant may feed more than usual placing an increased demand on the mother during the time that she is planning or preparing to return to work.

In contrast to this, an ascending trend was found for the reason of PIM, which may indicate that from three months a mother's perception of the sufficiency of her breast milk to fully nourish her infant decreases. Although mothers might understand the importance of breast milk, it is often viewed as being insufficient in quantity and deficient in nutrients to alone adequately nourish a baby for six months,[38] this is evidenced by the common practice of introducing solids at 2–3 months.[171] This ascending trend suggests that the older and bigger

the child gets, the stronger this perception becomes and together with societal pressures, lack of appropriate breastfeeding support groups and inconsistent advice from healthcare professionals,[151,171] leads to confusion and, subsequently, early supplementation with replacement feeds. Early cessation of exclusive breastfeeding may thus be a natural physiological response to PIM as breast milk is produced on a supply and demand basis.[151]

Other factors that may influence a mother's decision to exclusively breastfeed include:

Intention to exclusively breastfeed: One of the inclusion criteria of this study was that the mother had the intention to exclusively breastfeed her child for six months. This study found that not only was the definite intention to exclusively breastfeed for six months significantly associated with an increased sum of BSES-SF scores, but it was also an independent predictor of exclusive breastfeeding for a longer duration. Those who expressed uncertainty about their ability to maintain exclusive breastfeeding (those who responded that they "would try") were more likely to exclusively breastfeed for a shorter duration. This has been found to be a common factor for early cessation of breastfeeding noted by many researchers in both HIV-infected[92] and HIV-uninfected populations.[112,131,172–177] In addition, this study found that more HIV-infected mothers had a definite intention to breastfeed for six months versus HIV-uninfected mothers. The reason for this is most likely the fact that HIV-infected mothers are frequently educated on the benefits of breastfeeding as well as the risks of not breastfeeding or mixed feeding. This is a form of verbal persuasion that may increase a mother's breastfeeding self-efficacy (as evidenced by the HIV-infected mother's higher BSES-SF scores) which thus in turn contributes to the mothers' intention to exclusively breastfeed. This illustrates that any and all breastfeeding counselling is effective and should be strengthened, specifically in the current health systems. Contrasting with this, Goga[178] found that HIV-infected mothers had low breastfeeding intentions, although a possible reason for lower breastfeeding intentions at that time was the provision of free infant formula by local government.[2] In addition to this, the influence of self-efficacy on breastfeeding outcomes was apparent as breastfeeding intention was linked to a mother's choice of behaviour[142] where she chose not to engage in a specific behaviour (full breastfeeding) if she believed it outweighed her abilities.

Mixed feeding in hospital: As all the infants enrolled in this study were healthy, mixed feeding as a method of feeding in hospital, was akin to the introduction of infant formula for non-medical reasons. This study showed that the method of feeding in hospital was significantly associated with the sum of BSES-SF scores and was an independent risk factor for a shorter duration of breastfeeding, where those who mixed fed in the hospital

setting were more likely to stop exclusive breastfeeding earlier. Mixed feeding has previously been associated with poor breastfeeding outcomes[83–86] and may be linked to the breastfeeding self-efficacy expectation of performance accomplishment, where a mother feels confident in a task that she has successfully completed before.[142] A mother may doubt her ability to maintain full breastfeeding if she thought she was unable to breastfeed successfully in the first few hours or days postpartum. To support this, a systematic review in 2015 found that "baby-friendly" hospital support was one of the most effective interventions to improve rates of any breastfeeding.[87] Therefore, to reduce the incidence of mixed feeding for non-medical purposes, hospitals should strive to empower and educate new mothers about breastfeeding (as per the 'baby-friendly' guidelines) and refrain from giving formula milk in-hospital.

Previous research had established an association between maternal demographics (age, income and education) and breastfeeding outcomes. Older mothers with a higher level of education and a higher income tend to breastfeed exclusively for a longer duration. However, when exploring the effect of maternal demographics on breastfeeding self-efficacy, maternal age and income have a relatively limited influence[132,179] but in more than one study, education was retained as an important variable[179,180]. In contrast to this, our study found a significant relationship between breastfeeding self-efficacy and all three these demographic factors as well as race, HIV status and duration of ARV treatment.

Age: A woman was more likely to have a positive breastfeeding outcome if she had more than one child (multiparous), had breastfed previously (breastfeeding experience) and if her previous breastfeeding experience was rewarding. The older a mother is, the more likely it is that she meets these criteria. Our study mirrors this, where of the "older" mothers (those who were older than 35 years), the majority had breastfed previously and of these, most found their breastfeeding experience to be rewarding.

Education: Education seemed to be significantly associated only with the sum of BSES-SF scores and not with the duration of exclusive breastfeeding. This highlighted the fact that a mother's perception of her ability to carry out a task (sum of BSES-SF scores) did not always translate into action (breastfeeding) and therefore corresponds with the breastfeeding self-efficacy theory.

Income: Previous evidence suggests that income has a limited influence on breastfeeding self-efficacy. In this study, mothers with a lower income have a higher sum of BSES-SF scores possibly due to the fact that these mothers may breastfeed out of financial necessity.

Race: Whilst previous studies describing the influence of race on breastfeeding outcomes have been diverse,[83,120,137] this study indicates that African and mixed race women were more likely to have a higher sum of BSES-SF score and breastfeed for a longer duration. There are cultural and socioeconomic differences between various racial groups within South Africa which may affect a mother's decision to exclusively breastfeed. Traditionally, a stronger breastfeeding culture exists in the African communities[38,181] when compared to Westernised ones and, while this does not translate to exclusive breastfeeding, it may mean more breastfeeding role models (vicarious experience) and the expectation and general support (verbal persuasion) for any breastfeeding. In addition to this, a mother's positive attitude towards formula feeding has been associated with poorer breastfeeding outcomes.[182] If white and Indian mothers feel more favourable towards formula feeding (due to lack of breastfeeding role models), it may negatively influence their breastfeeding outcomes. In addition to this, although our study did not evaluate employment and breastfeeding outcomes, according to National Statistics, African and mixed race women were more likely to be unemployed[183] and, with no need to return to paid work, these mothers may have had more time to breastfeed and also may not be able to afford full replacement feeding.

HIV status: Although HIV status was not an independent predictor of breastfeeding outcomes in this study, more African and mixed race women were found to be HIV-infected, and several studies[178,184] have indicated that HIV-infected mothers undertake safer infant feeding practices than HIV-uninfected ones. This suggests that the counselling they received through routine Prevention of Mother-to-Child Transmission programmes may have influenced their feeding choices. Our study mirrors these results, specifically with regard to an increased duration of exclusive breastfeeding, where HIV-infected mothers had both higher BSES-SF scores and breastfed exclusively for a longer duration when compared with HIV-uninfected mothers. As the HIV-uninfected population is larger than the infected population, it is vital that they also be educated and supported as intensely with regards to exclusive breastfeeding benefits and not be neglected just because there is no immediate risk (i.e. transmission of HIV).

ARV treatment: Additionally, there was a significant difference between mothers who were on ARV treatment (irrespective of when it was initiated) and those not on ARV treatment where those on ARV treatment had higher breastfeeding confidence directly postpartum than those not on ARV treatment, and consequently those on treatment also breastfed for a longer duration. Those not receiving ARV treatment may have felt less confident in their

ability to successfully breastfeed due to the fear of HIV transmission through their breast milk or alternatively they might not have been exposed to the additional counselling described above (if they were previously undiagnosed or did not attend ante-natal classes).

The Wong-Baker FACES® Pain Rating Scale was not significantly associated with either the BSES-SF scores or the duration of exclusive breastfeeding in this population. Whilst there are no known studies that use this specific pain scale in relation to breastfeeding self-efficacy with which to compare these results, our results indicated that even though the mothers may experience pain at varying intensities post-partum it did not affect their breastfeeding outcomes.

While additional research is warranted to determine if breastfeeding self-efficacy can be improved and if this improvement translates to increased exclusive breastfeeding rates in the South African context, the results from this study indicate that the BSES-SF scores are applicable when identifying mothers at risk of early cessation of breastfeeding, up to three months, after which other factors seem to play a role in the early cessation of exclusive breastfeeding. This tool can be used by healthcare workers in public sector hospitals to identify mothers who are at high risk, and to assess intervention, and evaluation guidelines[112] for efficacy.

Confidence-building techniques could be used as an intervention for these mothers, specifically focusing on enhancing a mother's individual response to breastfeeding and thus her prenatal intention to breastfeed, including but not limited to avoidance of mixed feeding in the hospital setting as well as educating mothers on how to correctly identify hunger and satiety cues in their infants[185] (performance accomplishments), intensive peer support (vicarious experience) and expert advice (verbal persuasion).

Limitations of this study include the inherent but unavoidable effect that the researcher's monthly contact had on the mother's self-efficacy as evidenced by the higher than usual exclusive breastfeeding rates at six months, as well as the possibility that mothers may have been dishonest about their feeding habits to gain approval or prevent disappointment of an "authority" figure.

Other factors relating to breastfeeding self-efficacy and duration of exclusive breastfeeding that could be explored in future research include employment or time to return to paid work, maternal nutritional status, maternal smoking and alcohol habits and if the current pregnancy was planned or unintended.

Conclusion

Postnatal BSES-SF scores, intention to breastfeed for six months, method of feeding in hospital and race are independent predictors of an improved breastfeeding outcome in this population. Although not an independent predictor of breastfeeding outcomes, HIV-infected mothers have both higher BSES-SF scores and tend to breastfeed exclusively for a longer duration than HIV-uninfected ones. Interventions, based on breastfeeding self-efficacy theory, must be developed to improve breastfeeding self-confidence to address poor breastfeeding rates in South Africa.

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Conflict of interest

The authors have no conflicts of interest to declare.

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Contributions

AC, EvN and CM designed the research study. AC performed data collection and analysed the data with assistance from TE. AC, EvN and CM drafted the manuscript and reviewed the data. All authors read and approved the final version of the manuscript.

Supplementary material

Table 3: Highly significant and significant variables and sum of BSES-SF scores

		SUM of BSES-SF scores		p value
		Median	Interquartile range	
Age	18-35 years	60.0	54.0 - 65.5	<0.05
	>35 years	63.0	60.0; 67.0	
Race	African	62.0	56.0; 66.0	<0.001
	White	52.0	42.0; 60.0	
	Indian	46.0	40.0; 56.0	
	Mixed race	61.0	52.0; 66.0	
Education	None	70.0	70.0; 70.0	<0.05
	Primary School	61.0	30.0; 66.0	
	High School	62.0	55.0; 66.0	
	Tertiary	58.0	52.0; 64.0	
Home language	Zulu	62.0	56.0; 66.0	<0.05
	Sotho	58.0	55.0; 64.0	
	English	54.0	43.0; 63.0	
	Afrikaans	59.0	52.0; 65.0	
	Other*	62.0	57.0; 66.0	
Monthly income	<R1500/month	64.0	58.0; 68.0	<0.05
	R1501 - R3000/month	61.0	54.0; 66.0	
	R3001 - R6000/month	63.0	57.0; 66.0	
	R6001/month	60.0	52.0; 64.0	
Parity	Primiparous	55.0	49.5; 63.0	<0.001
	Multiparous	62.5	57.0; 66.0	
Multiple Gestation	Yes	40.0	30.0; 50.0	<0.05
	No	61.0	54.5; 66.0	
Gender of baby	Male singleton	63.0	54.0; 66.0	<0.05
	Female singleton	61.0	55.0; 65.0	
	Multiple gestation	40.0	30.0; 50.0	
	N/A, single infant	61.0	54.5; 66.0	
HIV status	Positive	64.0	60.0; 67.0	<0.001
	Negative	59.0	52.0; 64.0	
If positive, are you taking treatment?	Yes	64.0	60.0; 67.0	<0.001
	No	58.0	42.0; 69.0	
	N/A, not positive	59.0	52.0; 64.0	

*Other languages: Tswana, Xhosa, Sepedi, Venda, Tsonga, Swathi, Shona and Ndebele.

Were ARVs initiated before pregnancy?	Yes (pre-pregnancy)	64.5	59.0; 67.5	<0.001
	No (post-pregnancy)	64.0	60.0; 67.0	
	N/A, not on Rx	58.0	42.0; 69.0	
	N/A, not positive	59.0	52.0; 64.0	
If no, when were ARVs initiated post-pregnancy?	0-3 months of pregnancy	62.5	54.0; 67.5	<0.001
	Between 3-6 months of pregnancy	64.0	60.0; 65.0	
	Between 6 - final month of pregnancy	64.0	62.0; 68.0	
	N/A not on Rx	58.0	42.0; 69.0	
	N/A Rx initiated pre-pregnancy	64.5	59.0; 67.5	
	N/A not positive	59.0	52.0; 64.0	
Intention to exclusively breastfeed for 6 months	Yes	63.0	58.0; 67.0	<0.001
	No	0.0	0.0; 0.0	
	I will try	58.0	51.0; 64.0	
Method of feeding in hospital	Breastfeeding only	62.0	55.0; 66.0	<0.05
	Mixed feeding	57.0	50.0; 63.0	
	Formula only	0.0	0.0; 0.0	
Have you breastfed previously?	Yes	63.0	58.0; 66.0	<0.001
	No	55.0	50.0; 64.0	

Key: HIV = Human Immunodeficiency Virus; ARVs = Antiretroviral's; Rx = Treatment

Table 4: Highly significant and significant variables and duration of exclusive breastfeeding

		Breastfeeding duration		p-value
		1-2months n; %	3-6 months n; %	
		n=83	**n=215**	
Race	African	55; 66.3	181; 84.2	<0.05
	White	8; 9.6	5; 2.3	
	Indian	3; 3.6	1; 0.5	
	Mixed race	17; 20.5	28; 13.0	
	Other	0; 0.0	0; 0.0	
Home language	Zulu	15; 18.1	47; 21.9	<0.05
	Sotho	6; 7.2	19; 8.8	
	English	17; 20.5	14; 6.5	
	Afrikaans	13; 15.7	20; 9.3	
	Other*	32; 38.6	115; 53.5	
Monthly income	<R1500/month	8; 9.6	45; 20.9	<0.05
	R1501 - R3000/month	18; 21.7	62; 28.8	
	R3001 - R6000/month	15; 18.1	38; 17.7	
	R6001/month	42; 50.6	70; 32.6	
Parity	Primiparous	30; 36.1	50; 23.3	<0.05
	Multiparous	53; 63.9	165; 76.7	
HIV status	Positive	16; 19.3	91; 42.3	<0.05
	Negative	67; 80.7	124; 57.7	
If positive, are you taking treatment?	Yes	15; 18.1	89; 41.4	<0.05
	No	1; 1.2	2; 0.9	
	N/A, not positive	67; 80.7	124; 57.7	
Were ARVs initiated before pregnancy?	Yes (pre-pregnancy)	5; 6.0	27; 12.6	<0.05
	No (post-pregnancy)	10; 12.0	62; 28.8	
	N/A, not on Rx	1; 1.2	2; 0.9	
	N/A, not positive	67; 80.7	124; 57.7	

*Other languages: Tswana, Xhosa, Sepedi, Venda, Tsonga, Swathi, Shona and Ndebele.

If no, when were ARVs initiated post- pregnancy.	0-3 months of pregnancy	3; 15.0	17; 85.0	<0.05
	Between 3-6 months of pregnancy	3; 14.3	18; 85.7	
	Between 6 - final month of pregnancy	4; 12.9	27; 87.1	
	N/A not on Rx	1; 33.3	2; 66.7	
	N/A Rx initiated pre-pregnancy	5; 15.6	27; 84.4	
	N/A not positive	67; 35.1	124; 64.9	
Most recent CD4 count?	CD4 <350	2; 8.3	22; 91.7	<0.05
	CDV>350	10; 17.2	48; 82.8	
	I don't know	4; 16.0	21; 84.0	
	N/A, not positive	67; 35.1	124; 64.9	
Is your partner supportive of breastfeeding?	Yes	64; 27.5	169; 72.5	<0.05
	No	4; 100.0	0; 0.0	
	N/A (no partner)	6; 22.2	21; 77.8	
	I don't know	9; 26.5	25; 73.5	
Intention to exclusively breastfeed for 6 months	I don't know	35; 30.7	79; 69.3	<0.001
	6 months	20; 29.0	49; 71.0	
	>6 months	28; 24.3	87; 75.7	
Method of feeding in hospital	Breastfeeding only	66; 24.7	201; 75.3	<0.001
	Mixed feeding	17; 54.8	14; 45.2	
	Formula only	0; 0.0	0; 0.0	

Key: HIV = Human Immunodeficiency Virus; ARVs = Antiretroviral's; Rx = Treatment

CHAPTER 4: CONCLUSIONS AND RECOMENDATIONS

4.1 SUMMARY OF STUDY OBJECTIVE AND DESIGN

Despite the numerous benefits of breastfeeding, the exclusive breastfeeding rates amongst both HIV-infected and HIV-uninfected mothers in South Africa are low.[178] The current guidelines for breastfeeding, regardless of HIV status, have indicated that mothers should exclusively breastfeed their infants for the first six months, after which appropriate complementary foods should be introduced with continued breastfeeding up to a year. [1,46,47]

In the HIV-infected population, if the infant remains HIV-uninfected at one year breastfeeding should cease and the infant should be weaned onto an appropriate substitute. However, if the infant contracts HIV at this time, the recommendation is the same as with the HIV-uninfected population, which is to continue to breastfeed for two years and beyond, as long as it is mutually acceptable for both the mother and child.[1,6,43,44]

To date, no known studies have been conducted in South Africa using these tools and no known studies have explored the relationship between breastfeeding self-efficacy and HIV-infected mothers in relation to breastfeeding outcomes.

The main aim of this study was to determine if a relationship exists between breastfeeding self-efficacy (determined using the sum of the BSES-SF scores) and the duration of exclusive of breastfeeding in HIV-infected and HIV-uninfected mothers. The objectives are:

i. To determine if a high BFSES-SF score is predictive of an increased duration of exclusive breastfeeding in the study population.
ii. To determine if there is difference in BSES-SF scores between mothers who are HIV-infected and mothers who are HIV-uninfected.
iii. To determine if there is difference in the exclusivity of breastfeeding between HIV-infected and HIV-uninfected mothers.
iv. To describe additional factors that could affect a mother's breastfeeding self-efficacy and thus BSES-SF scores.

A cohort study was conducted and initial data was collected by the researcher between August 2014 and May 2015 from the postnatal wards at the Rahima Moosa Mother and Child Hospital in Coronationville, Johannesburg, Gauteng, South Africa. Mothers who gave

birth by normal vaginal delivery were approached within six hours postnatally and those who gave birth by Caesarean section were approached within 2-3 days postnatally.

Inclusion criteria for this study were as follows: The mother (1) intended to exclusively breastfeed her infant, (2) was 18 years or older, (3) gave birth to a full term infant (≥37 weeks gestation), (4) was able to understand spoken English, Afrikaans or Zulu, (5) had access to a cellular or land line telephone, (6) had given informed consent and (7) lives in South Africa regardless of citizenship. The initial questionnaire consisted of information pertaining to the mother's demographics, medical history, breastfeeding intentions and information, HIV status and treatment, perception of pain and BSES-SF scores (Appendix B).

The mother follow-up was conducted telephonically using one of two sets of telephonic questionnaires (Appendix C), on a monthly basis, until the mother was no longer practising full breastfeeding or the infant turned six months old (whichever occurred first), after which they were exited from the study, educated on the advantages of exclusive breastfeeding and, more importantly, the dangers of mixed feeding, and referred to their local clinic for additional information.

The original sample consisted of 329 mothers, of whom 31 (9.4%) were lost to follow-up; therefore the final study population consisted of 298 mothers. Of this final sample, 107 (35.9%) were HIV-infected and 191 (64.1%) were HIV-uninfected. The data was analysed according to the primary and secondary objectives.

4.2 ADDRESSING THE STUDY OBJECTIVES

In this section, the study objectives and the null hypothesis were addressed within the context of the results of this research.

4.2.1 Association between the sum of BSES-SF scores and duration of exclusive breastfeeding

H_o: A higher BSES-SF score is not predictive of an increased duration of exclusive breastfeeding.

The BSES-SF[141] is a shortened version of the original BSES[142] which can be administered quickly and easily by healthcare professionals in resource-limited settings such as public sector hospitals in South Africa. It has been found to be a valid, reliable and predictive tool

to identify mothers who were unlikely to have positive breastfeeding outcomes and would require additional intervention to ensure success. It was psychometrically tested in a group of Canadian mothers[141] and further methodological studies were conducted in Poland,[160] the United Kingdom[161] and the United States,[137] which all confirmed that the BSES-SF has sound psychometric properties and can be used in diverse groups of mothers.

No known studies have been conducted in the uniquely diverse South African setting to determine if there is an association between the sum of the BSES-SF scores and duration of exclusive breastfeeding. The results of this study indicated a significant positive correlation $(r = 0.315)$ between the sum of BSES-SF scores and duration of breastfeeding $(p =< 0.001)$. This indicated that enhanced breastfeeding self-efficacy, as determined by a higher sum of BSES-SF scores, was associated with a longer duration of breastfeeding. The durations of breastfeeding that carried the highest statistically significant differences in the sum of BSES-SF scores were 1–6 months and 2–6 months. For this reason the researcher distinguished low breastfeeding as 1–2 months (the mean score was 57.0) and high breastfeeding as 3–6 months (the mean score was 63.0).

Interestingly, the sums of BSES-SF scores were similar for mothers whether they stopped breastfeeding at 3, 4 or 5 months. When focussing on their reasons for breastfeeding cessation, the prolonged breastfeeding group cited returning to school or work, perception of insufficient milk (PIM) and “other” as reasons for cessation of breastfeeding. Some of the reasons the mother’s gave for early cessation of breastfeeding listed under ‘other’ includes: baby or mother currently admitted to hospital, bleeding or cracked nipples, baby was going ‘home’ to live separately from the mother, jaundice, mixed feeding in hospital, breast refusal, maternal choice and misinformation from the clinic.

A descending trend was observed for the reason “returning to work or school”. These results could be attributed to the fact that the South African Department of Labour states that a pregnant woman is eligible for four months of maternity leave, starting one month before her due date.[104] Returning to work is a well-known risk factor for early cessation of breastfeeding,[1,170] especially if the mother has inadequate support structures at home[1] or if the infant returns “home” to be looked after by a grandmother. Additionally, many women are not aware of their rights[13] with respect to breastfeeding or breast milk expression breaks (a breastfeeding mother is allowed two 30-minute breaks in the day for the first six months of her infant’s life[104]) and her working environment may not have any or may have

inadequate facilities for expressing and safe storage of her breast milk.[99] In addition to the stress that returning puts on a new mother, at approximately three months of age infants usually undergo a growth sourt. During a growth spurt, the infant may feed more than usual placing an increased demand on the mother during the time that she is planning or preparing to return to work.

An ascending trend was found for PIM possibly relating to a mother's perception that breast milk is insufficient to nourish her baby up to six months. This is evidenced by a 2007 qualitative study done by Buskens[38] which indicated that although southern African mothers understood the importance of breast milk, it was viewed as being insufficient in quantity and deficient in nutrients to adequately nourish a baby for six months.[38] These findings are reinforced by the common practice of introduction of solids at 2–3 months,[171] with infants in Gauteng and those residing in urban informal areas (such as the children of many of the mothers included in this study) having a younger mean age of introduction to solids than others.[60] It appears from our study that the older and bigger the child gets, the stronger this perception became. This, together with societal pressures and inconsistent advice from healthcare professionals with regard to HIV and infant feeding and complementary feeding,[171,186] can lead to confusion and, subsequently, early supplementation with replacement feeds (either formula milk or food). As a result, early cessation of exclusive breastfeeding may be a natural physiological response to PIM as breast milk is produced on a supply and demand basis.[151]

In conclusion, although the general trends indicated that a higher sum of BSES-SF score predicted a longer duration of breastfeeding, those who reached three months postpartum were possibly influenced by factors other than breastfeeding self-efficacy.

The null hypothesis is rejected. A higher BSES-SF score is predictive of an increased duration of exclusive breastfeeding up to three months, after which other factors play a role in a mother's decision to continue breastfeeding exclusively until six months.

4.2.2 Difference between the sum of the BSES-SF scores between HIV-infected and HIV-uninfected mothers

H_o: There is no difference in BSES-SF scores between mothers who are HIV-infected and mothers who are HIV-uninfected.

To date, no known studies have been conducted that explore the relationship between breastfeeding self-efficacy and HIV status.

The results from this study indicate that HIV-infected mothers had significantly higher sum of BSES-SF scores (64.0) than their HIV-uninfected counterparts (60.0). Theoretically, breastfeeding self-efficacy is influenced by a woman's self-efficacy expectations such as (1) own performance accomplishments, (2) vicarious experience, (3) verbal persuasion and (4) physiological response.[132]

HIV and breastfeeding have been in the spotlight for more than 15 years. As a result HIV-infected mothers are frequently in contact with healthcare professionals and receive regular breastfeeding education. All forms of lay and professional support have been found to increase the duration and exclusivity of breastfeeding by varying degrees up to six months postpartum.[95] This is possibly due to the impact that the self-efficacy expectation of verbal persuasion has on a mother's breastfeeding self-efficacy. Therefore, these results could be explained by the concurrent increase in maternal self-efficacy through the effect of verbal persuasion on breastfeeding self-efficacy and the subsequent effect this had on breastfeeding outcomes.

The null hypothesis is rejected. There is a difference in BSES-SF scores between mothers who are HIV-infected and mothers who are HIV-uninfected. The results of this study show that HIV-infected mothers have higher BSES-SF scores.

4.2.3 Difference between the duration of exclusive breastfeeding between HIV-infected and HIV-uninfected mothers

H_0: There is no difference in the duration of exclusive breastfeeding between HIV-infected and HIV-uninfected mothers.

Although there are no known studies determining the association between breastfeeding self-efficacy (measured using the sum of BSES-SF scores) and HIV status, there are associations between HIV status and exclusive breastfeeding duration. The factors influencing duration of exclusive breastfeeding were largely similar in both the HIV-infected and HIV-uninfected populations. Reasons such as a mother's prenatal intention to breastfeed[142,161], introduction of formula for non-medical reasons[83–86] and race[83,137] were

mirrored in this study, which concluded that these, together with the sum of BSES-SF scores, were independent predictors of an increased duration of breastfeeding.

When observing the differences in this study between HIV-infected and HIV-uninfected mothers with respect to these independent predictors, a higher percentage of HIV-infected mothers had a definite intention to breastfeed, breastfed exclusively while in hospital and were African, compared with HIV-uninfected mothers. Thus more of the mothers in the HIV-infected group shared the independent predictor's of an increased duration of exclusive breastfeeding than the HIV-uninfected mothers.

Other reasons why an HIV-infected mother may breastfeed for a longer duration could be increased self-efficacy due to intensive prenatal counselling regarding the importance of exclusive breastfeeding in reducing the risk of mother to child transmission if practiced correctly. In addition, due to their constant contact with healthcare professionals and clinics, HIV-infected mothers may be more health-seeking, especially if faced with breast problems (like nipple pain, bleeding nipples and mastitis), thus resolving the problem instead of allowing breastfeeding to cease.

An interesting difference between the two groups is the effect of education on duration of breastfeeding. In HIV-uninfected mothers it is well documented that the lower the mother's level of education,[84,121,122,124,126,132] the less likely she will successfully breastfeed for a prolonged duration, and the higher her level of education, the longer she will breastfeed.[187] Conversely, a study in Malawi found that maternal education was inversely related to breastfeeding duration in an HIV-infected population, with up to 91% of mothers discontinuing breastfeeding by 24 weeks.[131] The study suggested that a higher level of education was possibly linked to higher earning potential. Consequently, because those mothers could afford replacement feeding, their intention to breastfeed for a prolonged period diminished.[131] Alternatively, they may have chosen to breastfeed for a shorter period to avoid disclosing their HIV status to others.[131] The results from this study support the findings in Malawi, where the higher the level of education, the shorter the breastfeeding duration. Of the HIV-infected mothers, fewer were educated at a tertiary level than at high school level and of those with tertiary education, more had a higher income when compared with high school graduates.

Our results show that there was a statistically significant difference in breastfeeding duration between HIV-infected [Group 1 ($n = 16$; 15.0%) and Group 2 ($n = 91$; 85.0%)] and HIV-uninfected mothers [Group 1 ($n = 67$; 35.1%) and 2 ($n = 124$; 64.9%)]. The direction of association indicates that HIV-infected mother's breastfeed for a longer duration (80.7%) than HIV-uninfected mothers (57.7%).

The null hypothesis is rejected. There is a difference in the duration of exclusive breastfeeding between HIV-infected and HIV-uninfected mothers. The results of this study indicate that HIV-infected mother's breastfeed exclusively for a longer duration than HIV-uninfected mothers.

4.2.4 Description of additional factors that could affect breastfeeding self-efficacy and thus BSES-SF scores

As described previously, breastfeeding self-efficacy, as indicated by the sum of BSES-SF scores, was an independent predictor of breastfeeding outcomes in this population, where a higher score predicts a longer duration of breastfeeding. To determine what kinds of interventions were needed to improve breastfeeding outcomes, the factors that influence both BSES-SF scores and breastfeeding duration should be explored.

An association between maternal demographics such as age, education and income and breastfeeding outcomes have been established in previous research. Older mothers with a higher level of education and a higher income tend to breastfeed exclusively for a longer duration. However, when exploring the effect of maternal demographics on breastfeeding self-efficacy, maternal age and income have a relatively limited influence[132,179] but in more than one study, education was retained as an important variable[179,180]. In contrast to this, our study found a significant relationship between breastfeeding self-efficacy and all three these demographic factors as well as race, HIV status and duration of ARV treatment.

It has been shown that a woman is more likely to have a positive breastfeeding outcome if she had more than one child (multiparous), had breastfed previously (breastfeeding experience) and if her previous breastfeeding experience was rewarding. The older a mother is, the more likely it is that she meets these criteria. Our study corroborates this, where of the "older" mothers (those who were older than 35 years), the majority had breastfed previously and of these, most found their breastfeeding experience to be rewarding. This links back to the breastfeeding self-efficacy expectation of performance

accomplishments, where a mother feels confident in a task that she has successfully completed before. These older mothers also breastfed for a longer duration.

Higher levels of education were found to be negatively associated with breastfeeding self-efficacy where mothers with a higher level of education (tertiary education versus high school) had a lower sum of BSES-SF scores. In addition to this, education was only significantly associated with the sum of BSES-SF scores and not with the duration of exclusive breastfeeding. This highlighted the fact that a mother's perception of her ability to carry out a task (sum of BSES-SF scores) did not always translate into action (breastfeeding) and therefore corresponds with the breastfeeding self-efficacy theory.

A lower income was positively associated with both the duration of breastfeeding and sum of BSES-SF scores possibly due to financial necessity (inability to afford a replacement feed) or due to additional time as these did not need to return to work, affording them the time to continue breastfeeding.

The effects of race (and subsequently home language) on breastfeeding outcomes was unclear. In this study, it was evident that African and mixed race women had a higher sum of BSES-SF scores and breastfed for a longer duration than white or Indian women. In addition, women who spoke Zulu/other had the highest scores followed by Sotho, Afrikaans and English respectively. In this study, race and home language are related, as all of the mothers who spoke Zulu or Sotho were African and the majority of the mothers who spoke Afrikaans were mixed race. Race and home language can be partially attributed to the self-efficacy expectation, vicarious experience, where African and mixed race women reside in communities where there is a strong breastfeeding culture and where breastfeeding is considered the norm.

The effects of HIV and duration of ARV treatment on breastfeeding self-efficacy is poorly understood. This study indicates that HIV-infected mothers had a higher sum of BSES-SF scores and breastfed for a longer duration than HIV-uninfected mothers. This may be due to adequate counselling from healthcare professionals as well as a strong prenatal intention to breastfeed and decreased mixed feeding in the hospital setting. Additionally, there was a significant difference between mothers who were on ARV treatment (irrespective of when it was initiated) and those not on ARV treatment where those on ARV treatment had higher breastfeeding confidence directly postpartum than those not on ARV treatment, and

consequently those on treatment also breastfed for a longer duration. Those not receiving ARV treatment may have felt less confident in their ability to successfully breastfeed due to the fear of HIV transmission through their breast milk or alternatively they might not have been exposed to the additional counselling described above (if they were previously undiagnosed or did not attend ante-natal classes).

4.3 LIMITATIONS OF THE INVESTIGATION

The following limitations may have influenced the results of this study:

i. The monthly contact the researcher had with the mothers may have inadvertently increased their breastfeeding self-efficacy, as evidenced by the high rate of full breastfeeding at six months.
ii. There is a possibility that some mothers may have been dishonest about their breastfeeding habits to gain approval or prevent disappointment of an “authority figure” in the healthcare profession.

The following methodological changes could have strengthened the results of the study:

i. The BSES-SF could have been administered prenatally, directly postnatally as well as at three months and six months postpartum to correctly identify which risk factors at these times directly influenced the sum of BSES-SF scores.
ii. The original questionnaire could have included questions around issues such as employment or time of return to paid work, maternal nutritional status, maternal smoking and alcohol habits and whether the current pregnancy was planned or unintended. This may have provided insight into additional factors that could identify mothers at high risk of breastfeeding cessation, and thus help focus intervention strategies and guide policy changes (such as extended maternity leave, malnutrition prevention programmes and additional counselling for mothers who smoke or drink or have unplanned pregnancies).

4.4 RECOMMENDATIONS

Recommendations to address the research questions include:

i. To the best of the researcher’s knowledge, this was the first study to examine the breastfeeding self-efficacy theory in South Africa. Further research should be conducted to confirm the validity of the BSES-SF in a variety of South African settings (public and private) and at various points throughout the mother’s pre- and postnatal period to assess where breastfeeding self-efficacy is at its lowest.

ii. This study was the first in the world to compare BSES-SF scores between HIV-infected and HIV-uninfected mothers. However, more studies are needed to confirm and explore these differences.
iii. This study clearly illustrates that intensive counseling and frequent contact with healthcare professionals exerts a benefit on breastfeeding outcomes (as seen in the HIV-infected population). The same level of education and interaction should be applied to HIV-uninfected mothers.
iv. This study provides adequate evidence to focus resources on strengthening breastfeeding self-efficacy through interventions that support breastfeeding self-efficacy expectations namely avoidance of mixed feeding in the hospital setting and assisting mothers to correctly identify hunger and satiety cues in their infants, intensive peer and hospital based support groups as well as correct and consistent expert advice from healthcare professionals.
v. The BSES-SF has been confirmed by our study as a valuable instrument for identifying women at risk of early cessation of exclusive breastfeeding. Together with other demographic, medical and breastfeeding factors, this instrument could be useful to directing limited resources to those most in need of breastfeeding support.

Recommendations for future research include the following:

i. Qualitative research to explore the factors that influence exclusivity of breastfeeding between HIV-infected and HIV-uninfected mothers beyond breastfeeding self-efficacy is warranted.
ii. To create effective intervention strategies that will increase exclusive breastfeeding rates on a large scale, future studies should focus on determining what modifiable factors influence a mother's breastfeeding self-efficacy (and therefore BSES-SF scores).
iii. -SF scores at various points, both pre- and postnatally, so that mothers can be targeted when they feel the least confident to successfully exclusively breastfeed.
iv. The effect of food insecurity and subsequently the effect of maternal and infant nutritional status on breastfeeding self-efficacy.
v. The effect of cultural differences in South Africa on breastfeeding self-efficacy and subsequently duration of exclusive breastfeeding.
vi. The effect of formal education on breastfeeding self-efficacy between HIV-infected and HIV-uninfected mothers, as well as exploring the reasons affecting a mother's decision not to breastfeed or to breastfeed for a shorter period.

vii. The effect of returning to paid work on breastfeeding self-efficacy in light of South Africa's maternity leave policy and exploration of the knowledge and compliance of employers and employees to breastfeeding allowances in the workplace.

viii. The knowledge and practices of clinicians and healthcare workers relating to breastfeeding and the latest HIV guidelines should be explored to assess barriers to consistent and correct advice.

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APPENDIX A: INITIAL SCREENING TOOL

Please complete all sections (A – C)

Questions to ask the participant before entry into the BSES-SF study:

Information obtained from the file:

Section A
Is the mother 18 years or older? (Born after July 1996)
Was the baby born at ≥37 weeks?
Is the mother a South African citizen?
Section B
Is the baby in 16B or the Neonatal Intensive Care Unit?
Does the baby have any birth defects that may influence feeding?
Does the mother require specialized/ long term care?

Information to ask the participant directly:

Section C
Can you understand spoken English/ Afrikaans/ Zulu?
Do you want to try to give your baby **only breastmilk for 6 months?**
Do you have access to a landline/ cellular telephone?

1. **Section A and C:** Are all the answers found to be 'Yes'?

2. **Section B:** Are all the answers found to be 'No'?

If the answers to questions 1 and 2 above are 'Yes', only then is the participant eligible for the study. Please indicate this on the patient record form.

If participant is eligible, please ask the participant to complete informed consent forms.

APPENDIX B1: ENGLISH DATA COLLECTION

Please complete all sections (A – F)

Section A: Demographic information (Please tick appropriate answer)		
A1. Age:	18 – 35 (1)	
	>35 (2)	
A2. Race:	African (1)	
	White (2)	
	Indian (3)	
	Coloured (4)	
	Other (5)	
A3. Schooling:	None (1)	
	Primary school (2)	
	High school (3)	
	Tertiary (4)	
A4. Language spoken at home:	Zulu (1)	
	Sotho (2)	
	English (3)	
	Afrikaans (4)	
	Other (5)	
A5. Marital status:	Unmarried (1)	
	Married (2)	
	Divorced (3)	
	Widowed (4)	
A6. Income:	<R1500/m (1)	
	R1501 - R3000/m (2)	
	R3001 - R6000/m (3)	
	>R6001/m (4)	

Section B: Medical information (Please tick appropriate answer)		
B1. Is this your first live child?	Yes (1)	
	No (2)	
B2. Birthing method:	Normal Vaginal Delivery (1)	
	Caesarean Section (2)	
B3. Multiple gestation:	Yes (1)	
	No (2)	
B3.1 If yes:	Twins (1)	
	Triplets (2)	
	Other (3)	
	Not applicable, single infant (4)	
B4. Gender of baby:	Male singleton (1)	
	Female singleton (2)	
	Multiple gestation (3)	
B4.1 Number of male infants if multiple gestation?	Zero (1)	
	One (2)	
	Two (3)	
	Three (4)	
	Not applicable, single infant (5)	
B4.2 Number of female infants if multiple gestation?	Zero (1)	
	One (2)	
	Two (3)	
	Three (4)	
	Not applicable, single infant (5)	

Section C: HIV information (Please tick appropriate answer)		
C1. HIV status:	Positive (1)	
	Negative (2)	
C2. If positive, are you taking treatment?	Yes (1)	
	No (2)	
	Not applicable, not positive (3)	
C3. If yes, are you on lifelong Antiretroviral Therapy (ART)?	Yes (1)	
	No (2)	
	Not applicable, not on Rx (3)	
	Not applicable, not positive (4)	
C3.1 If yes, when did you start your lifelong ART?	0 – 6 months before falling pregnant (1)	
	6 – 12 months before falling pregnant (2)	
	>12 months before falling pregnant (3)	
	Not applicable, not on Rx (4)	
	Not applicable, not on lifelong ART (5)	
	Not applicable, not positive (6)	
C4. If you are not on <u>lifelong</u> ART, when did you start taking ARV's (Antiretrovirals) after you fell pregnant?	0 - 3 months of pregnancy (1)	
	Between 3 – 6 months of pregnancy (2)	
	Between 6 - final month of pregnancy (3)	
	Not applicable, not on Rx (4)	
	Not applicable, on ART (5)	
	Not applicable, not positive (6)	
C5. What is your most recent CD4 count?	CD4 <350 (1)	
	CD4 >350 (2)	
	I don't know (3)	
	Not applicable, not positive (4)	

Section D: Breastfeeding information (Please tick appropriate answer)		
D1. Do you know what exclusive breastfeeding means?	Yes (1)	
	No (2)	
D2. Do you believe that giving your baby only breastmilk for the first few months of his/her life is good for your baby?	Yes (1)	
	No (2)	
D3. Are you going to give your baby only breastmilk for the first 6 months of his/ her life?	Yes (1)	
	No (2)	
	I will try (3)	
D4. For how long do you want to breastfeed your baby?	I don't know (1)	
	6 months (2)	
	>6 months (3)	
D5. Is breastfeeding important to you?	Very important (1)	
	Important (2)	
	Not important (3)	
D6. Why is breastfeeding important to you?	Health of baby (1)	
	Health of mother (2)	
	Health of both (3)	
	Other (4)	
	Not applicable, not important to me (5)	
D7. Method of feeding in hospital:	Breastfeeding only (1)	
	Mixed feeding (2)	
	Formula only (3)	
D8. Is your partner supportive of breastfeeding?	Yes (1)	
	No (2)	
	Not applicable (no partner) (3)	
	I don't know (4)	
D9. Is there someone close to you in your life that has successfully given only breastmilk to their baby for 6 months?	Yes (1)	
	No (2)	
D10. Have you breastfed previously?	Yes (1)	
	No (2)	
D10.1 Which words describe how you felt about breastfeeding your previous child:	Rewarding, wonderful, joyous, good (1)	
	Disappointing, painful, bad (2)	
	Not applicable, have not breastfed before (3)	

Section E: The Wong-Baker FACES® Pain Rating Scale (Please write in the answer)

Please choose a face that best depicts the pain that you are currently experiencing.

E1. Answer:	

Section F: The BSES-SF (Please write in the answer)	
Please answer the following questions by indicating your confidence level/ how sure are you of the following statements on a scale of 1 – 5 where: 1. Not confident at all/ Not sure of myself at all 2. Not very confident/ Not very sure of myself 3. Somewhat confident/ Somewhat sure of myself 4. Confident/ Sure of myself 5. Very confident/ Very sure of myself	
F1. I can always determine that my baby is getting enough milk.	
F2. I can always successfully handle breastfeeding, like I have handled other challenging tasks.	
F3. I can always breastfeed my baby without using formula milk as a supplement.	
F4. I can always make sure that my baby is properly attached onto the breast with his/her mouth for the whole feeding.	
F5. I can always manage the breastfeeding circumstances to my satisfaction.	
F6. I can always manage to breastfeed even when my baby is crying.	
F7. I can always keep wanting to breastfeed.	
F8. I can always comfortably breastfeed with family members present.	
F9. I can always be satisfied with my breastfeeding experience.	
F10. I can always deal with the fact that breastfeeding can use up a lot of my time.	
F11. I can always finish feeding my baby on one breast before switching to the other breast.	
F12. I can always continue to breastfeed my baby for every feed.	
F13. I can always manage to keep up with my baby's breastfeeding demands.	
F14. I can always tell when my baby is finished breastfeeding.	
SUM of TOTAL scores:	
Section G: Geographical information	
G1. Where do you live?	
G2. How long have you lived at your current residence?	
G3. Hometown:	
G4. When did you move from your hometown?	

APPENDIX B2: ZULU DATA COLLECTION

Please complete all sections (A – F)

Section A: Demographic information (Please tick appropriate answer)		
A1. Age **(Iminyaka yobudala):**	18 – 35 (1)	
	>35 (2)	
A2. Race **(Uhlanga):**	African/ **Umuntu Omnyama** (1)	
	White/ **Umuntu Omhlophe** (2)	
	Indian/ **Indiya** (3)	
	Coloured/ **Ikhaladi** (4)	
	Other/ **Olunye** (5)	
A3. Schooling **(Izinga lemfundo):**	None/ **Awufundile** (1)	
	Primary school/ **Isikole samabanga aphansi** (2)	
	High school/ **Isikole samabanga aphezulu** (3)	
	Tertiary/ **Imfundo yamabanga aphakeme** (4)	
A4. Language spoken at home **(Ulimi olukhulunywa ekhaya):**	Zulu/ **IsiZulu** (1)	
	Sotho/ **IsiSotho** (2)	
	English/ **IsiNgisi** (3)	
	Afrikaans/ **IsiBhunu** (4)	
	Other/ **Olunye** (5)	
A5. Marital status **(Isimo somshado):**	Unmarried/ **Awushadile** (1)	
	Married/ **Ushadile** (2)	
	Divorced/ **Udivosile** (3)	
	Widowed/ **Ungumfelwa/ Ungumfelokazi** (4)	
A6. Income **(Umholo):**	<R1500/m (1)	
	R1501 - R3000/m (2)	
	R3001 - R6000/m (3)	
	>R6001/m (4)	

Section B: Medical information (Please tick appropriate answer)		
B1. Is this your first live child **(Umtwana wakho wokuqala)?**	Yes/ **Yebo** (1)	
	No/ **Cha** (2)	
B2. Birthing method **(Indlela yokubeletha):**	Normal Vaginal Delivery/ **Ubelethe Ngendlela Ejwayelekile** (1)	
	Caesarean Section/ **Ubelethe ngokuhlizwa** (2)	
B3. Multiple gestation **(Ngabe ubelethe abantwana abaningi ngesikhathi esisodwa):**	Yes/ **Yebo** (1)	
	No/ **Cha** (2)	
B3.1 If yes **(Uma impendulo ithi yebo):**	Twins/ **Abantwana ababili** (1)	
	Triplets/ **Abantwana abathathu** (2)	
	Other/ **Okunye** (3)	
	Not applicable, single infant (4)	
B4. Gender of baby **(Ubulili bengane):**	Male singleton/ **Ngumfana** (1)	
	Female singleton/ **Yintombazane** (2)	
	Multiple gestation/ **Ubelethe abantwana abaningi ngesikhathi esisodwa** (3)	
B4.1 Number of male infants if multiple gestation **(Bangaki abafana obabelethile uma bengaphezu koyedwa)?**	Zero/ **Akekho** (1)	
	One/ **Munye** (2)	
	Two/ **Babili** (3)	
	Three/ **Bathathu** (4)	
	Not applicable, single infant (5)	
B4.2 Number of female infants if multiple gestation **(Mangaki amantombazane owabelethile uma engaphezu kweyodwa)?**	Zero/ **Ayikho** (1)	
	One/ **Yinye** (2)	
	Two/ **Mabili** (3)	
	Three/ **Mathathu** (4)	
	Not applicable, single infant (5)	

Section C: HIV information (Please tick appropriate answer)		
C1. HIV status **(Ithini imiphumela oyitholile ngenkathi uhlolelwa igciwane le-HIV):**	Positive/ **Unalo igciwane** (1)	
	Negative/ **Awunalo igciwane** (2)	
C2. If positive, are you taking treatment **(Uma unalo igciwane, ngabe uyawathatha amaphilisi okudambisa igciwane)?**	Yes/ **Yebo** (1)	
	No/ **Cha** (2)	
	Not applicable, not positive (3)	
C3. If yes, are you on lifelong Antiretroviral Therapy (ART) **(Ngabe usohlelweni lokwelashwa ngemishanguzo (ART) okumele uyidle impilo yakho yonke)?**	Yes/ **Yebo** (1)	
	No/ **Cha** (2)	
	Not applicable, not on treatment (3)	
	Not applicable, not positive (4)	
C3.1 If yes, when did you start your lifelong ART **(Uma kunjalo, ufakwe nini ngaphansi kohlelo lokwelashwa ngemishanguzo okumele uyidle impilo yakho yonke (ART)?**	0 – 6 months before falling pregnant/ **0 – 6 izinyanga ngaphambi kokukhulelwa** (1)	
	6 – 12 months before falling pregnant/ **6 – 12 izinyanga ngaphambi kokukhulelwa** (2)	
	> 12 months before falling pregnant/ **> 12 izinyanga ngaphambi kokukhulelwa** (3)	
	Not applicable, not on treatment (4)	
	Not applicable, not on lifelong ART (5)	
	Not applicable, not positive (6)	
C4. If you are not on lifelong ART, when did you start taking ARV's (Antiretrovirals) after you fell pregnant **(Uma ungekho ngaphansi kohlelo lokwelashwa ngemishanguzo (ART) okumele uyidle impilo yakho yonke, uqale nini ukuthatha amaphilisi okudambisa igciwane (ARV's)?**	0 - 3 months of pregnancy/ **0 - 3 izinyanga zokukhulelwa** (1)	
	Between 3 – 6 months of pregnancy **Phakathi kuka 3 - 6 wezinyanga ukhulelwe** (2)	
	Between 6 - final month of pregnancy/ **Phakathi kwenyanga yesi-6 kanye nenyanga yokugcina ukhulelwe** (3)	
	Not applicable, not on Rx (4)	
	Not applicable, on ART (5)	
	Not applicable, not positive (6)	
C5. What is your most recent CD4 count **(Ithini imiphumela yokubalwa kwamasosha akho omzimba (CD4) okusanda kwenziwa)?**	**CD 4<350** (1)	
	CD 4>350 (2)	
	I don't know/ **Angazi** (3)	
	Not applicable, not positive (4)	

Section D: Breastfeeding information (Please tick appropriate answer)		
D1. Do you know what exclusive breastfeeding means **(Ngabe uyazi ukuthi ukunika umntwana ubisi lwebele kuphela kuchazani)?**	Yes/ **Yebo** (1)	
	No/ **Cha** (2)	
D2. Do you believe that giving your baby only breastmilk for the first few months of his/her life is good for your baby **(Ngabe uyakholwa ukuthi ukunika umntwana wakho ubisi lwebele kuphela ezinyangeni ezimbalwa zokuqala kunosizo kumntwana wakho)?**	Yes/ **Yebo** (1)	
	No/ **Cha** (2)	
D3. Are you going to give your baby only breastmilk for the first 6 months of his/ her life**/ (Ngabe uzonika umntwana wakho ubisi lwebele kuphela ezinyangeni eziyisithupha zokuqala)?**	Yes/ **Yebo** (1)	
	No/ **Cha** (2)	
	I will try/ **Ngizozama** (3)	
D4. For how long do you want to breastfeed your baby **(Ngabe uhlose ukuncelisa umntwana wakho ibele kuze kuphele isikhathi esingakanani)?**	I don't know/ **Angazi** (1)	
	<6 months/ **<6 izinyanga** (2)	
	>6 months/ **>6 izinyanga** (3)	
D5. Is breastfeeding important to you **(Ngabe ukuncelisa umntwana wakho ibele kubalulekile kuwena)?**	Very important/ **Kubaluleke kakhulu** (1)	
	Important/ **Kubalulekile** (2)	
	Not important/ **Akubalulekile** (3)	
D6. Why is breastfeeding important to you **(Ngabe kubaluleke ngani kuwena ukuncelisa umntwana wakho ibele)?**	Health of baby/ **Kunosizo kwimpilo yomntwana** (1)	
	Health of mother/ **Kunosizo kwimpilo kamama** (2)	
	Health of both/ **Kunosizo kwimpilo kamama neyomntwana** (3)	
	Other/ **Okunye** (4)	
	Not applicable, not important to me (5)	
D7. Method of feeding in hospital **(Indlela obekuphakelwa ngayo umntwana ukudla ngenkathi esesibhedlela):**	Breastfeeding only/ **Ubisi lwebele kuphela** (1)	
	Mixed feeding/ **Ukudla okuxubile** (2)	
	Formula only/ **Ubisi lwebhodlela kuphela** (3)	
D8. Is your partner supportive of breastfeeding **(Ngabe umlingani wakho uyakweseka ukuncelisa ibele)?**	Yes/ **Yebo** (1)	
	No/ **Cha** (2)	
	Not applicable (no partner)/ **Cha (Anginaye**	

	umlingani) (3)	
	I don't know/ **Angazi** (4)	
D9. Is there someone close to you in your life that has successfully given only breastmilk to their baby for 6 months **(Ngabe ukhona osondelene nawe oseke wasebenzisa ubisi lwebele kuphela ngempumelelo izinyanga eziyisithupha)?**	Yes/ **Yebo** (1)	
	No/ **Cha** (2)	
D10. Have you breastfed previously **(Ngabe uke wancelisa ibele esikhathini esedlule)?**	Yes/ **Yebo** (1)	
	No/ **Cha** (2)	
D10.1 Which words describe how you felt about breastfeeding your previous child **(Yimaphi amagama achaza kabanzi ukuba uzizwe njani ngankathi uncelisa ingane yakho ngaphambili.)**	Rewarding, wonderful, joyous, good/ **Kuklomela, mangalisayo, injabulo/ kuhle** (1)	
	Disappointing, painful, bad/ **Kudumaza, ubuhlungu/ okubi**(2)	
	Not applicable, have not breastfed before (3)	

Section E: The Wong-Baker FACES® Pain Rating Scale (Please write in the answer)

Please choose a face that best depicts the pain that you are currently experiencing**/**

Sicela ukhethe ubuso obufanelekile obukhombisa ubuhlungu obuzwayo njengamanje

E1. Answer:	

Section F: The BSES-SF (Please write in the answer)	
Please answer the following questions by indicating your confidence level/ how sure are you of the following statements on a scale of 1 – 5 where (Ngicela uphendule imibuzo elandelayo ngokuveza izinga lokuzethemba kwakho ngokwesilinganiso 1 kuya ku 5): 1. Not confident at all/ Not sure of myself at all/ **Awuzethembi nakancane** 2. Not very confident/ Not very sure of myself/ **Unokungazethembi okuthile** 3. Somewhat confident/ Somewhat sure of myself/ **Uyazethemba kancane** 4. Confident/ Sure of myself/ **Uyazethemba** **5.** Very confident/ Very sure of myself/ **Unokuzethemba okukhulu**	
F1. I can always determine that my baby is getting enough milk. **(Njalo ngiyakwazi ukubona ukuthi umntwana wami uyaluthola yini ubisi olwanele.)**	
F2. I can always successfully handle breastfeeding, like I have handled other challenging tasks. **(Njalo ngiyakwazi ukubhekana nomsebenzi wokuncelisa umntwana wami ibele ngempumelelo, ngendlela efanayo engibhekane ngayo neminye imisebenzi eyinselelo engiyenzile.)**	
F3. I can always breastfeed my baby without using formula milk as a supplement. **(Njalo ngiyakwazi ukuncelisa umntwana wami ubisi lwebele ngaphandle kokunezezela ngobisi lwebhodlela.)**	
F4. I can always make sure that my baby is properly attached onto the breast with his/her mouth for the whole feeding. **(Njalo ngiyakwazi ukuqinisekisa ukuthi umntwana wami unamathele ngendlela efanele ebeleni ngomlomo wakhe uma ngimncelisa ibele aze aqede ukuncela.)**	
F5. I can always manage the breastfeeding circumstances to my satisfaction. **(Njalo ngiyakwazi ukulawula umsebenzi wokuncelisa umntwana wami ibele ngendlela egculisayo.)**	
F6. I can always manage to breastfeed even when my baby is crying. **(Njalo ngiyakwazi ukuncelisa umntwana wami ibele ngisho ekhala.)**	
F7. I can always keep wanting to breastfeed. **(Njalo ngihlale nginesifiso sokuncelisa umntwana wami ibele.)**	
F8. I can always comfortably breastfeed with family members present. **(Njalo ngiyakwazi ukuncelisa umntwana wami ibele phambi komndeni wami ngokukhululeka.)**	
F9. I can always be satisfied with my breastfeeding experience. **(Njalo ngiyakwazi ukuzizwa ngigculisekile ngomsebenzi wami wokuncelisa umntwana wami ibele.)**	
F10. I can always deal with the fact that breastfeeding can use up a lot of my time. **(Njalo ngiyakwazi ukumelana nenkinga yokuthi ukuncelisa ibele kuthatha isikhathi sami esiningi.)**	
F11. I can always finish feeding my baby on one breast before switching to the other breast. **(Njalo ngiyakwazi ukunikeza umntwana wami ibele elilodwa aze asuthe ngaphambi kokudlulela kwelinye.)**	
F12. I can always continue to breastfeed my baby for every feed. **(Njalo ngiyakwazi ukuqhubeka nokuncelisa umntwana wami ibele ngasosonke isikhathi sokudla.)**	

F13. I can always manage to keep up with my baby's breastfeeding demands. **(Njalo ngiyakwazi ukumelana nezidingo zomntwana wami zokunceliswa ubisi lwebele.)**	
F14. I can always tell when my baby is finished breastfeeding. **(Njalo ngiyakwazi ukubona uma umntwana wami eseqedile ukuncela ibele.)**	
SUM of TOTAL scores:	
Geographical information (Please write in the answer)	
Where do you live?	
How long have you lived at your current residence?	
Hometown:	
When did you move from your hometown?	

APPENDIX B3: AFRIKAANS DATA COLLECTION

Please complete all sections (A – F)

Section A: Demographic information (Please tick appropriate answer)		
A1. Age **(Ouderdom):**	18 – 35 (1)	
	>35 (2)	
A2. Race **(Ras):**	African/ **Afrikaanse** (1)	
	White/ **Blank** (2)	
	Indian/ **Indiër** (3)	
	Coloured/ **Kleurling** (4)	
	Other/ **Ander** (5)	
A3. Schooling **(Onderrig):**	None/ **Geen** (1)	
	Primary school/ **Laerskool** (2)	
	High school/ **Hoërskool** (3)	
	Tertiary/ **Tersiër** (4)	
A4. Language spoken at home **(Huistaal):**	Zulu/ **Zulu** (1)	
	Sotho/ **Sotho** (2)	
	English/ **Engels** (3)	
	Afrikaans/ **Afrikaans** (4)	
	Other/ **Ander** (5)	
A5. Marital status **(Huwelikstaat):**	Unmarried/ **Ongetroud** (1)	
	Married/ **Getroud** (2)	
	Divorced/ **Geskei** (3)	
	Widowed/ **Weduwee** (4)	
A6. Income **(Inkomste):**	**<R1500/m (1)**	
	R1501 - R3000/m (2)	
	R3001 - R6000/m (3)	
	>R6001/m (4)	

Section B: Medical information (Please tick appropriate answer)		
B1. Is this your first live child **(Is hierdie jou eerste lewende baba)?**	Yes/ **Ja** (1)	
	No/ **Nee** (2)	
B2. Birthing method **(Geboorte metode):**	Normal Vaginal Delivery/ **Normale vaginale geboorte** (1)	
	Caesarean Section/ **Keiser snit**(2)	
B3. Multiple gestation **(Meertalige swangerskap):**	Yes/ **Ja** (1)	
	No/ **Nee** (2)	
B3.1 If yes **(Indien ja):**	Twins/ **Tweeling** (1)	
	Triplets/ **Drieling** (2)	
	Other/ **Ander** (3)	
	Not applicable, single infant (4)	
B4. Gender of baby **(Geslag van baba):**	Male singleton/ **Manlike enkeling** (1)	
	Female singleton/ **Vroulike enkeling** (2)	
	Multiple gestation/ **Meertalige swangerskap** (3)	
B4.1 Number of male infants if multiple gestation **(Getal manlike kinders, indien meertalige swangerskap)?**	Zero/ **Nul** (1)	
	One/ **Een** (2)	
	Two/ **Twee** (3)	
	Three/ **Drie** (4)	
	Not applicable, single infant (5)	
B4.2 Number of female infants if multiple gestation **(Getal vroulike kinders, indien meertalige swangerskap)?**	Zero/ **Nul** (1)	
	One/ **Een** (2)	
	Two/ **Twee** (3)	
	Three/ **Drie** (4)	
	Not applicable, single infant (5)	

Section C: HIV information (Please tick appropriate answer)		
C1. HIV status **(MIV status):**	Positive/ **Positief** (1)	
	Negative/ **Negatief** (2)	
C2. If positive, are you taking treatment **(Indien positief, neem jy behandeling)?**	Yes/ **Ja** (1)	
	No/ **Nee** (2)	
	Not applicable, not positive (3)	
C3. If yes, are you on lifelong Antiretroviral Therapy (ART) **(Indien positief, is jy op lewingslange Antiretroviral Terapie (ART)?**	Yes/ **Ja** (1)	
	No/ **Nee** (2)	
	Not applicable, not on Rx (3)	
	Not applicable, not positive (4)	
C3.1 If yes, when did you start your lifelong ART **(Indien ja, wanneer het jy met jou lewenslange ART begin)?**	0 – 6 months before falling pregnant/ **0 – 6 maande voor jou swangerskap** (1)	
	6 – 12 months before falling pregnant/ **6 – 12 maande voor jou swangerskap** (2)	
	> 12 months before falling pregnant/ **> 12 maande voor jou swangerskap** (3)	
	Not applicable, not on Rx (4)	
	Not applicable, not on lifelong ART (5)	
	Not applicable, not positive (6)	
C4. If you are not on lifelong ART, when did you start taking ARV's (Antiretrovirals) after you fell pregnant **(Indien nie op lewenslange ART, wanneer het jy ARV's (Antiretrovirals) begin gebruik, na jy swanger geraak het)?**	0 - 3 months of pregnancy/ **0 - 3 maande van swangerskap** (1)	
	Between 3 – 6 months of pregnancy **Tussen 3 – 6 maand van swangerskap** (2)	
	Between 6 - final month of pregnancy/ **Tussen 6de en finale maand van swangerskap** (3)	
	Not applicable, not on Rx (4)	
	Not applicable, on ART (5)	
	Not applicable, not positive (6)	
C5. What is your most recent CD4 count **(Wat is jou jongste CD4 telling)?**	**CD 4<350** (1)	
	CD4>350 (2)	
	I don't know/ **Ek weet nie** (3)	
	Not applicable, not positive (4)	

Section D: Breastfeeding information (Please tick appropriate answer)		
D1. Do you know what exclusive breastfeeding means **(Verstaan jy wat exclusief borsvoeding bedoel)?**	Yes/ **Ja** (1)	
	No/ **Nee** (2)	
D2. Do you believe that giving your baby only breastmilk for the first few months of his/her life is good for your baby **(Glo jy dat om net vir jou baba slegs borsmelk te gee vir die eerste paar maande van sy lewe goed vir jou baba is)?**	Yes/ **Ja** (1)	
	No/ **Nee** (2)	
D3. Are you going to give your baby only breastmilk for the first 6 months of his/ her life**/ (Gaan jy jou baba slegs borsmelk gee vir die eerste 6 maande)?**	Yes/ **Ja** (1)	
	No/ **Nee** (2)	
	I will try/ **Ek sal probeer** (3)	
D4. For how long do you want to breastfeed your baby **(Vir hoe lank is jy van plan om jou baba te borsvoed)?**	I don't know/ **Ek weet nie** (1)	
	<6 months/ **<6 maande** (2)	
	>6 months/ **>6 maande** (3)	
D5. Is breastfeeding important to you **(Is borsvoeding belangrik vir jou)?**	Very important/ **Baie belangrik** (1)	
	Important/ **Belangrik** (2)	
	Not important/ **Nie belangrik** (3)	
D6. Why is breastfeeding important to you **(Hoekom is borsvoeding belangrik vir jou)?**	Health of baby/ **Gesondheid van baba** (1)	
	Health of mother/ **Gesondheid van ma** (2)	
	Health of both/ **Gesondheid van beide** (3)	
	Other/ **Ander** (4)	
	Not applicable, not important to me/ **Nie van toepassing nie, nie belangerik vir my** (5)	
D7. Method of feeding in hospital **(Metode van voeding in hospitaal):**	Breastfeeding only/ **Slegs borsvoeding** (1)	
	Mixed feeding/ **Gemengde voeding** (2)	
	Formula only/ **Slegs Formule** (3)	
D8. Is your partner supportive of breastfeeding **(Is jou eggenoot/ gesel ondersteunend met borsvoeding)?**	Yes/ **Ja** (1)	
	No/ **Nee** (2)	
	Not applicable (no partner)/ **Nie van toepassing nie**, **geen eggenoot** (3)	
	I don't know/ **Ek weet nie** (4)	
D9. Is there someone close to you in your life that has successfully given only breastmilk to their baby for 6 months **(Is daar iemand na aan jou in jou lewe wat suksesvol net borsmelk vir hulle kind**	Yes/ **Ja** (1)	
	No/ **Nee** (2)	

gegee vir 6 maande)?		
D10. Have you breastfed previously **(Het jy voorheen geborsvoed)?**	Yes/ **Ja** (1)	
	No/ **Nee** (2)	
D10.1 Which words describe how you felt about breastfeeding your previous child (**Watter woorde beskryf hoe jy oor boersvoeding gevoel het met jou voorige kind)**:	Rewarding, wonderful, joyous, good/ **Belonde, wonderlik, gellukig, goed** (1)	
	Disappointing, painful, bad/ **Teleurgesteld, seer , sleg** (2)	
	Not applicable, have not breastfed before/ **Nie van toepassing nie**, **het nie voorheen geborsvoed nie**(3)	

Section E: The Wong-Baker FACES® Pain Rating Scale (Please write in the answer)

Please choose a face that best depicts the pain that you are currently experiencing**/**
Kies asseblief 'n gesig wat jou huidige pyn die beste beskryf

E1. Answer:	

Section F: The BSES-SF (Please write in the answer)

Please answer the following questions by indicating your confidence level/ how sure are you of the following statements on a scale of 1 – 5 where (Antwoord asseblief die volgende vrae deur jou selfvertroue op 'n skaal van 1 -5 aantedui waar):

1. Not confident at all/ Not sure of myself at all/ **Geen self vertroue**
2. Not very confident/ Not very sure of myself/ **Nie veel self vertroue**
3. Somewhat confident/ Somewhat sure of myself/ **Redelike self vertroue**
4. Confident/ Sure of myself/ **Self vertroud**
5. Very confident/ Very sure of myself/ **Volkome self vertroue**

F1. Ek kan altyd bepaal dat my baba genoeg melk kry.	
F2. Ek kan borsvoeding suksesvol hanteer, soos ek ander uitdagende take hanteer.	
F3. Ek kan altyd my baba borsvoed sonder om 'n formule melk te gebruik om te supplimenteer.	
F4. Ek kan altyd verseker dat my baba oordentelik met sy mond op my bors aangeheg is vir die hele voeding.	
F5. Ek kan altyd die borsvoeding omstandighede beheer tot my bevrediging.	
F6. Ek kan altyd borsvoed, al huil my baba.	
F7. Ek sal altyd wil aanhou borsvoed.	
F8. Ek kan altyd gemaklik borsvoed terwyl familie teenwoordig is.	
F9. Ek kan altyd tevrede wees met my borsvoeding ervaaring.	
F10. Ek kan altyd anvaar dat borsvoeding tydsaam kan wees.	
F11. Ek kan altyd my baba aan een bors klaar voed voor ek na die ander bors oorskakel.	
F12. Ek kan altyd my baba met elke voeding borsvoed.	
F13. Ek kan altyd by bly met my baba se borsvoeding vereistes.	
F14. Ek kan altyd weet wanneer my baba klaar geborsvoed het.	
Getaal van die TOTALE telling:	

Section G: Geographical information (Please write in the answer)

G7. Where do you live **(Waar bly jy nou)**?	
G8. How long have you lived at your current residence **(Vir hoe lang bly jy by jour heidige verblyf)**?	
G9. Hometown **(Tuis dorp)**:	
G10. When did you move from your hometown **(Wanner het jy van jou tuis dorp getrek)**?	

APPENDIX C1: ENGLISH SET TELEPHONE QUESTIONNAIRE

Please complete relevant sections

Questionnaire # 1 (Use on the 1st, 3rd and 5th months):

Month:		**1**			**3**			**5**		
Please tick each call attempt (3 x per day for 3 days)		D1	D2	D3	D1	D2	D3	D1	D2	D3
		D1	D2	D3	D1	D2	D3	D1	D2	D3
		D1	D2	D3	D1	D2	D3	D1	D2	D3
If unable to contact after 3 calls a day, 3 consecutive days, state reason:										
a.	Are you still breastfeeding your baby?	Yes	No		Yes	No		Yes	No	
b.	If **you are NOT breastfeeding your baby anymore**, please state your reason for stopping breastfeeding and how long you breastfed your baby for (days/ weeks)? **If mom IS STILL breastfeeding, continue with questionnaire below.**	Reason if not BF:			Reason if not BF:			Reason if not BF:		
If the mom is NOT BREASTFEEDING her baby anymore, no further questions will be asked, discuss discussion points with her and end the interview. **If mom IS STILL breastfeeding continue with questionnaire:**										
c.	If **you ARE STILL breastfeeding your baby**, is your baby receiving **ONLY BREAST MILK**? i.e. No other food or drink, with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines.	Yes	No		Yes	No		Yes	No	
d.	Have you given your baby water, sugar water, tea, fruit juice or sorol (oral rehydration solution)?	Yes	No		Yes	No		Yes	No	
If the mom is FULL BREASTFEEDING, remind her of the next telephone appointment.		Date for next interview if EBF			Date for next interview if EBF			Date for next interview if EBF		
If the mom is PARTIAL FEEDING, continue with questionnaire for information gathering.										
e.	If **PARTIAL FEEDING**, please state your reason for mixed feeding.									
f.	If **PARTIAL FEEDING**, is your baby receiving some breast milk as well as	Yes	No		Yes	No		Yes	No	

	some formula?						
g.	If **PARTIAL FEEDING**, is your baby receiving some breastmilk as well as food/ purity/ baby porridge or other?	Yes	No	Yes	No	Yes	No
h.	If **PARTIAL FEEDING**, is your baby receiving some breastmilk as well as some formula **AND** food/ purity/ baby porridge or other?	Yes	No	Yes	No	Yes	No

If the mom is NOT BREASTFEEDING or PARTIAL FEEDING, discuss discussion points below with her.

DISCUSSION POINTS Section A:		
A1. Is mom HIV infected?	**Yes**	**No**

If **mom is HIV infected**, discuss points 1- 7 in section B
If **mom is HIV uninfected**, discuss points 2- 7 in section B

DISCUSSION POINTS Section B:	✓ **if done**
B1. Partial feeding (giving breastmilk and formula milk before 6 months) increases your baby's risk of getting HIV by 3-4 times.	
B2. Partial feeding results in decrease breastmilk intake and subsequently decreased milk production and thus increasing perception of 'not enough milk'.	
B3. Exclusive breastfeeding decreases your child's chances of dying from diarrhoea and pneumonia and getting allergies.	
B4. Exclusive breastfeeding may decrease your child's risk of heart disease, stroke and cancer later on in life.	
B5. Exclusive breastfeeding may decrease your child's risk of becoming obese later on in life.	
B6. Breastmilk is inexpensive and requires no additional equipment to serve and prepare.	

DISCUSSION POINTS Section C:		
C1. Has mother been counselled about the dangers of partial feeding/ advantages of full breastfeeding for the first 6 months?	Yes	No
C2. Has the mother been referred to local clinic for additional information?	Yes	No
C3. Which is her local clinic?		
Month exited from study:		

Key: Yes= 1; No= 2; FBF= Full breastfeeding; BF= Breastfeeding

Questionnaire # 2 (Use on the 2nd, 4th and 6th months):

Month:		**2**			**4**			**6**		
Please tick each call attempt (3 x per day for 3 days)		D1	D2	D3	D1	D2	D3	D1	D2	D3
		D1	D2	D3	D1	D2	D3	D1	D2	D3
		D1	D2	D3	D1	D2	D3	D1	D2	D3
If unable to contact after 3 calls a day, 3 consecutive days, state reason:										
a.	Did your baby receive some breastmilk this week?	Yes	No		Yes	No		Yes	No	
b.	If **you are NOT breastfeeding your baby anymore**, please state your reason for stopping breastfeeding and how long you breastfed your baby for (days/ weeks)? **If mom IS STILL breastfeeding, continue with questionnaire below.**	Reason if not BF:			Reason if not BF:			Reason if not BF:		
If the mom is NOT BREASTFEEDING her baby anymore, no further questions will be asked, discuss discussion points with her. **If mom IS STILL breastfeeding continue with questionnaire:**										
c.	If **you ARE STILL breastfeeding your baby**, did you give your baby anything else besides breastmilk?	Yes	No		Yes	No		Yes	No	
d.	Have you given your baby water, sugar water, tea, fruit juice or sorol (oral rehydration solution)?	Yes	No		Yes	No		Yes	No	
If the mom is FULL BREASTFEEDING remind her of the next telephone appointment.		Date for next interview if EBF			Date for next interview if EBF			Date for next interview if EBF		
If the mom is PARTIAL FEEDING, continue with questionnaire for information gathering.										
e.	If **PARTIAL FEEDING**, please state your reason for mixed feeding.									
f.	If **PARTIAL FEEDING**, have you ever given your baby formula together with the breast milk?	Yes	No		Yes	No		Yes	No	

g.	If **PARTIAL FEEDING**, have you ever given your baby food/ purity/ baby porridge or other together with your breastmilk?	Yes	No	Yes	No	Yes	No
h.	If **PARTIAL FEEDING**, is your baby receiving some formula **AND** food/ purity/ baby porridge or other together with your breastmilk?	Yes	No	Yes	No	Yes	No

If the mom is NOT BREASTFEEDING or PARTIAL FEEDING, discuss discussion points below with her.

DISCUSSION POINTS Section A:		
A1. Is mom HIV infected?	**Yes**	**No**

If **mom is HIV infected**, discuss points 1- 7 in section B
If **mom is HIV uninfected**, discuss points 2- 7 in section B

DISCUSSION POINTS Section B:	✓ **if done**
B1. Partial feeding (giving breastmilk and formula milk before 6 months) increases your baby's risk of getting HIV by 3-4 times.	
B2. Partial feeding results in decrease breastmilk intake and subsequently decreased milk production and thus increasing perception of 'not enough milk'.	
B3. Exclusive breastfeeding decreases your child's chances of dying from diarrhoea and pneumonia and getting allergies.	
B4. Exclusive breastfeeding may decrease your child's risk of heart disease, stroke and cancer later on in life.	
B5. Exclusive breastfeeding may decrease your child's risk of becoming obese later on in life.	
B6. Breastmilk is inexpensive and requires no additional equipment to serve and prepare.	

DISCUSSION POINTS Section C:		
C1. Has mother been counselled about the dangers of partial feeding/ advantages of exclusive breastfeeding for the first 6 months?	Yes	No
C2. Has the mother been referred to local clinic for additional information?	Yes	No
C3. Which is her local clinic?		
Month exited from study:		

Key: Yes= 1; No= 2; FBF= Full breastfeeding; BF= Breastfeeding

APPENDIX C2: ZULU SET TELEPHONE QUESTIONNAIRE

Please complete relevant sections

Questionnaire# 1 (Use on the 1st, 3rd and 5th months)

Month:		**1**			**3**			**5**		
Please tick each call attempt (3 x per day for 3 days)		D1	D2	D3	D1	D2	D3	D1	D2	D3
		D1	D2	D3	D1	D2	D3	D1	D2	D3
		D1	D2	D3	D1	D2	D3	D1	D2	D3
If unable to contact after 3 calls a day, 3 consecutive days, state reason:										
a.	**Usayincelisa ingane yakho?** (Are you still breastfeeding your baby?)	Yebo		Cha	Yebo		Cha	Yebo		Cha
b.	**Uma kungenjalo. Sicela usho isizathu esenza ugcine ukuncelisa kungabe isikhathi esingakananiuyincelisa ingane (Izinsukwana, Iviki).** (If **you are <u>NOT</u> breastfeeding your baby anymore**, please state your reason for stopping breastfeeding and how long you breastfed your baby for (days/ weeks)? **If mom <u>IS STILL</u> breastfeeding, continue with questionnaire below.**)	Reason if not BF:			Reason if not BF:			Reason if not BF:		
If the mom is <u>NOT BREASTFEEDING</u> her baby anymore, no further questions will be asked, discuss discussion points with her and end the call. No follow up given. **If mom is <u>STILL</u> breastfeeding continue with questionnaire:**										
c.	**Uma kunjalo kungabe ingane yakho idla ubisi lwebele kuphela? Akukho okunye ukdla noma uphuzo, ngisho namanzi, Noma okuncane okuwuketshezi.** (If **you <u>ARE STILL</u> breastfeeding your baby**, is your baby receiving **<u>ONLY BREAST MILK</u>**? i.e. No other food or drink, with the exception of drops or syrups consisting of vitamins, mineral	Yebo		Cha	Yebo		Cha	Yebo		Cha

	supplements or medicines.)						
d.	**Ingabe uyiphile ingane yini amanzi?** (Have you given your baby water?)	Yebo	Cha	Yebo	Cha	Yebo	Cha
If the mom is <u>EXCLUSIVELY BREASTFEEDING</u>, remind her of the next telephone appointment.		**Date for next interview if EBF**		**Date for next interview if EBF**		**Date for next interview if EBF**	
If the mom is <u>MIXED FEEDING</u>, continue with questionnaire for information gathering.							
e.	If **<u>MIXED FEEDING</u>**, please state your reason for mixed feeding.						
f.	**Uma kungejalo kungabe ingane iyaluthola ubisi lwethini noma olwebele.** (If **<u>MIXED FEEDING</u>**, is your baby receiving some breast milk as well as some formula?)	Yebo	Cha	Yebo	Cha	Yebo	Cha
g.	**Kungabe ingane yakho ithola ubisi lwebele kanye nokudla, upuridi, nepapa lezingane kanye nokunye.** (If **<u>MIXED FEEDING</u>**, is your baby receiving some breast milk as well as some food/ purity/ baby porridge or other?)	Yebo	Cha	Yebo	Cha	Yebo	Cha
h.	**Kungabe lomntwana udla ubisi lwebele kanye nolwethini nokudla, iperidi, nepapa lezingane nokunye.** (If **<u>MIXED FEEDING</u>**, is your baby receiving some breastmilk as well as some formula **<u>AND</u>** food/ purity/ baby porridge or other?)	Yebo	Cha	Yebo	Cha	Yebo	Cha
If the mom is <u>NOT BREASTFEEDING</u> or <u>MIXED FEEDING</u>, discuss discussion points below with her.							
Complete sections A, B and C							
DISCUSSION POINTS Section A:							
A1. Is mom HIV infected?				**Yes**		**No**	
If **yes**, discuss points 1- 7 in section B. If **no**, discuss points 2- 7 in section B							

DISCUSSION POINTS Section B:	✓ **if done**
B1. Ukuxubanisa ukudla, ukunikezelaa ngobisi lwebele kanye nelopowder ngaphambi kwezinyanga eziyisithupha ubeka ingane yakho egxupheni yokuthola iHIV ngokuphindwe kathathu nomakane. (Mixed feeding (giving breastmilk and formula milk before 6 months) increases your baby's risk of getting HIV by 3-4 times.)	
B2. Imiphumela ukudla ukwehlisa ubisi lwebele thatha izinto kanye nemiphumela evela kamuva uyaphuza ukubona nokwehla kobisi kanye ngalendlela kukhuphuka izinga lokuqondisa kokungabi nolwanele ubisi. (Mixed feeding results in decrease breastmilk intake and subsequently decreased milk production and thus increasing perception of 'not enough milk'.)	
B3. Uhlelo luhlukile lokuncelisa lwehisela ingane yakho amathuba okubulawa sheka kanye isishiso samaphaphu. (Exclusive breastfeeding decreases your child's chances of dying from diarrhoea and pneumonia.)	
B4. Uhlelo oluhlukile lokunelisa lwehlisela ingane yakho amathuba okungena komzimba. (Exclusive breastfeeding reduces your child's chances of getting allergies.)	
B5. Uhlelo oluhlukile lukuncelisa lingehlisela ingane yakho amathuba okuthola izifo zenhliziyo, istroke kanye nomdlavuza ongavela kamuva empilweni. (Exclusive breastfeeding may decrease your child's risk of heart disease, stroke and cancer later on in life.)	
B6. Uhlelo olwahlukile lokuncelisa lingehlisela amathuba ukuba ingane yakho ibe ne (obese empilweni kamuve). (Exclusive breastfeeding may decrease your child's risk of becoming obese later on in life.)	
B7. Ubisi lwebele lubiza kancane futhi aluding kwengezwa nazindlela zokulenza akanye nokulinikezela. (Breastmilk is inexpensive and requires no additional equipment to serve and prepare.)	

DISCUSSION POINTS Section C:		
C1. Has mother been counselled about the dangers of mixed feeding/ advantages of exclusive breastfeeding for the first 6 months?	Yes	No
C2. Has the mother been referred to local clinic for additional information?	Yes	No
C3. Which is her local clinic?		
Month exited from study:		

Key: Yebo= 1; Cha= 2; EBF= Exclusive breastfeeding; BF= Breastfeeding

Questionnaire# 2 (Use on the 2nd, 4th and 6th months)

Month:		**2**			**4**			**6**		
		D1	D2	D3	D1	D2	D3	D1	D2	D3
		D1	D2	D3	D1	D2	D3	D1	D2	D3
		D1	D2	D3	D1	D2	D3	D1	D2	D3
If unable to contact after 3 calls a day, 3 consecutive days, state reason:										
a.	**Kungabe ingane yakho ilutholile ubisi lwebele kancane kuleviki?** (Did your baby receive some breastmilk this week?)	Yebo	Cha		Yebo	Cha		Yebo	Cha	
b.	**Uma kungenjalo. Ngicela ubeke isikhathi esingakanani uyaluncelisa usana lwakho kungaba (usuku, lviki).** (If **you are <u>NOT</u> breastfeeding your baby anymore**, please state your reason for stopping breastfeeding and how long you breastfed your baby for (days/ weeks)? **If mom <u>IS STILL</u> breastfeeding, continue with questionnaire below.)**	Reason if not BF:			Reason if not BF:			Reason if not BF:		
If the mom is <u>NOT BREASTFEEDING</u> her baby anymore, no further questions will be asked, discuss discussion points with her and end the call. No follow up given. **If mom is <u>STILL</u> breastfeeding continue with questionnaire:**										
c.	**Uma kunjalo, uyayinika yini ingane yakho okunye okuseceleni ngaphandle kobisi lwebele.** (If **you <u>ARE STILL</u> breastfeeding your baby**, did you give your baby anything else besides breastmilk?)	Yebo	Cha		Yebo	Cha		Yebo	Cha	
d.	**Ingabe uyiphile ingane yini amanzi?** (Have you given your baby water?)	Yebo	Cha		Yebo	Cha		Yebo	Cha	
If the mom is <u>EXCLUSIVELY BREASTFEEDING</u>, remind her of the next telephone appointment.		**Date for next interview if EBF**			**Date for next interview if EBF**			**Date for next interview if EBF**		

If the mom is MIXED FEEDING, continue with questionnaire for information gathering.							
e	If **MIXED FEEDING**, please state your reason for mixed feeding.						
f	**Uke wanikeza ingane yakho ubisis iformula walixuba nelwebele.** (If **MIXED FEEDING**, have you ever given your baby formula together with the breast milk?)	Yebo	Cha	Yebo	Cha	Yebo	Cha
g	**Uke manikeza ingane yakho ukudla kwezinye uphuridi, ipapa lezingane noma ukunye kanye nobisi lwebele?** (If **MIXED FEEDING**, have you ever given your baby food/ purity/ baby porridge or other together with your breastmilk?)	Yebo	Cha	Yebo	Cha	Yebo	Cha
h	**Kungabe ingane yakho idla ubisi ifomula kanye nokudla uphuridi, ipapa lwengane noma okunye kanye nobisi lwebele.** (If **MIXED FEEDING**, is your baby receiving some formula **AND** food/ purity/ baby porridge or other together with your breastmilk?)	Yebo	Cha	Yebo	Cha	Yebo	Cha

If the mom is NOT BREASTFEEDING or MIXED FEEDING, discuss discussion points below with her.		
Complete sections A, B and C		
DISCUSSION POINTS Section A:		
A1. Is mom HIV infected?	**Yes**	**No**
If **yes**, discuss points 1- 7 in section B. If **no**, discuss points 2- 7 in section B		
DISCUSSION POINTS Section B:		✓ **if done**
B1. Ukuxubanisa ukudla, ukunikezelaa ngobisi lwebele kanye nelopowder ngaphambi kwezinyanga eziyisithupha ubeka ingane yakho egxupheni yokuthola iHIV ngokuphindwe kathathu nomakane. (Mixed feeding (giving breastmilk and formula milk before 6 months) increases your baby's risk of getting HIV by 3-4 times.)		

B2. Imiphumela ukudla ukwehlisa ubisi lwebele thatha izinto kanye nemiphumela evela kamuva uyaphuza ukubona nokwehla kobisi kanye ngalendlela kukhuphuka izinga lokuqondisa kokungabi nolwanele ubisi. (Mixed feeding results in decrease breastmilk intake and subsequently decreased milk production and thus increasing perception of 'not enough milk'.)		
B3. Uhlelo luhlukile lokuncelisa lwehisela ingane yakho amathuba okubulawa sheka kanye isishiso samaphaphu. (Exclusive breastfeeding decreases your child's chances of dying from diarrhoea and pneumonia.)		
B4. Uhlelo oluhlukile lokunelisa lwehlisela ingane yakho amathuba okungena komzimba. (Exclusive breastfeeding reduces your child's chances of getting allergies.)		
B5. Uhlelo oluhlukile lukuncelisa lingehlisela ingane yakho amathuba okuthola izifo zenhliziyo, istroke kanye nomdlavuza ongavela kamuva empilweni. (Exclusive breastfeeding may decrease your child's risk of heart disease, stroke and cancer later on in life.)		
B6. Uhlelo olwahlukile lokuncelisa lingehlisela amathuba ukuba ingane yakho ibe ne (obese empilweni kamuve). (Exclusive breastfeeding may decrease your child's risk of becoming obese later on in life.)		
B7. Ubisi lwebele lubiza kancane futhi aluding kwengezwa nazindlela zokulenza akanye nokulinikezela. (Breastmilk is inexpensive and requires no additional equipment to serve and prepare.)		
DISCUSSION POINTS Section C:		
C1. Has mother been counselled about the dangers of mixed feeding/ advantages of exclusive breastfeeding for the first 6 months?	Yes	No
C2. Has the mother been referred to local clinic for additional information?	Yes	No
C3. Which is her local clinic?		
Month exited from study:		

Key: Yebo= 1; Cha= 2; EBF= Exclusive breastfeeding; BF= Breastfeeding

APPENDIX C3: AFRIKAANS SET TELEPHONE QUESTIONNAIRE

Please complete relevant sections
Questionnaire # 1 (Use on the 1st, 3rd and 5th months)

Month:		**1**			**3**			**5**		
		D1	D2	D3	D1	D2	D3	D1	D2	D3
		D1	D2	D3	D1	D2	D3	D1	D2	D3
		D1	D2	D3	D1	D2	D3	D1	D2	D3
If unable to contact after 3 calls a day, 3 consecutive days, state reason:										
a	Borsvoed jy nogsteeds jou baba?	Ja	Nee		Ja	Nee		Ja	Nee	
b	Indien nie, meld asseblief jou rede hoekom jy borsvoeding gestaak het en hoe lank jy wel jou baba geborsvoed het (dae / weke)?									
If no, no further questions will be asked. Discuss discussion points with participant. At the end of the call inform the mother that she has been exited from the study and you will no longer call her.										
c	Indien ja, het jou baba slegs borsmelk ontvang? bv geen ander kos of vloeistof nie, nie eens water nie, met die uitsondering van druppels of stroop soos vitamiene, minerale aanvullings of medisyne.	Ja	Nee		Ja	Nee		Ja	Nee	
d	Het jy water vir jou baba gegee?	Ja	Nee		Ja	Nee		Ja	Nee	
e	Indien jy voedings meng, se aseblief hoekom jy dit doen?									
If ja, remind the mother of the next telephone appointment and end the call.										
If nee, continue with questionnaire for information gathering. At the end of the call inform the mother that she has been exited from the study and you will no longer call her.										
f	Indien nie, ontvang jou baba sommige borsmelk asooksommige formule?	Ja	Nee	N/A	Ja	Nee	N/A	Ja	Nee	N/A
g	Ontvang jou baba sommige borsmelk asook kos / purity / baba pap of ander?	Ja	Nee	N/A	Ja	Nee	N/A	Ja	Nee	N/A
h	Indien ja, spesifiseer asseblief watter een van die bogenoemde lys, bv kos.									

i	Ontvang jou baba sommige borsmelk asooksommige formule **en** kos / purity / baba pap of ander?	Ja	Nee		Ja	Nee		Ja	Nee	
j	Indien ja, spesifiseer asseblief watter een van die bogenoemde lys, bv formule en purity.									

If mom is **MIXED feeding** her baby, she is **excited** from the study and the advantages of exclusive breastfeeding and dangers of mixed feeding an infant <6 months must be discussed.
Complete sections A, B and C

Section A:

Is mom MIV geinfecteer?	**Ja**	**Nee**

If **ja**, discuss points 1- 7 in section B. If **nee**, discuss points 2- 7 in section B

Section B:	✓ **if done**
Gemengdevoeding (borsmelk wat saam met formule melk gegee word voor 6 maande) verhoog jou baba se risiko met 3-4 keer om met die MIV virus besmette word.	
Gemengde voeding veroorsaak minder borsmelk inname en dus verlaagde melk produksie, dit veroorsaak dan ‘n persepsie van nie genoeg melk nie.	
Eksklusiewe borsvoeding verminder jou kind se kanse om te sterf van diarree en long ontsteking.	
Eksklusiewe borsvoeding verminder jou kindse kanse op allergieë.	
Eksklusiewe borsvoeding kan jou kindse risiko vir hartsiektes, beroerte en kanker verlaag later in die lewe.	
Eksklusiewe borsvoeding kan jou kindse risiko vir vetsugtigheid later in die lewe verminder.	
Borsmelk is goedkoop en het geen bykomende toerusting nodig om op te dien of voorteberei nie.	

Section C:

Has mother been counselled about the dangers of mixed feeding/ advantages of exclusive breastfeeding for the first 6 months?	Yes	No
Has the mother been referred to local clinic for additional information?	Yes	No
Which is her local clinic?		
If no, please specify a reason:		
Month exited from study:		

Key: Ja= 1; Nee= 2; N/A= 3

Questionnaire # 2 (Use on the 2nd, 4th and 6th months)

Month:		2			4			6		
		D1	D2	D3	D1	D2	D3	D1	D2	D3
		D1	D2	D3	D1	D2	D3	D1	D2	D3
		D1	D2	D3	D1	D2	D3	D1	D2	D3
If unable to contact after 3 calls a day, 3 consecutive days, state reason:										
a	Het jou baba hierdie week sommige borsmelk ontvang?	Ja	Nee		Ja	Nee		Ja	Nee	
b	Indien nie, meld asseblief jou rede hoekom jy met borsvoeding opgehou het en hoe lank jy jou baba geborsvoed het (dae / weke)?									
If <u>nee</u>, no further questions will be asked. Discuss discussion points with participant. At the end of the call inform the mother that she has been exited from the study and you will no longer call her.										
c	Indien ja, het jy jou baba enigiets anders behalwe borsmelk gegee?	Ja	Nee		Ja	Nee		Ja	Nee	
d	Het jy water vir jou baba gegee?	Ja	Nee		Ja	Nee		Ja	Nee	
e	Indien jy voedings meng, se aseblief hoekom jy dit doen?		N/A			N/A			N/A	
If <u>nee</u>, remind the mother of the next telephone appointment and end the call.										
If <u>ja</u>, continue with questionnaire for information gathering. At the end of the call inform the mother that she has been exited from the study and you will no longer call her.										
f	Indien ja, het jy al ooit vir jou baba formule saam met jou borsmelk gegee?	Ja	Nee	N/A	Ja	Nee	N/A	Ja	Nee	N/A
g	Het jy al ooit vir jou baba kos / purity / baba pap / saam met jou borsmelk gegee?	Ja	Nee	N/A	Ja	Nee	N/A	Ja	Nee	N/A
h	Indien ja, spesifiseer asseblief watter een van die bogenoemde lys, bv kos.			N/A			N/A			N/A
i	Ontvang jou baba formule **en** kos /purity /baba pap /ander saam met jou borsmelk?	Ja	Nee	N/A	Ja	Nee	N/A	Ja	Nee	N/A

j	Indien ja, spesifiseer asseblief watter een van die bogenoemde lys, bv formule en purity.		N/A		N/A		N/A

If mom is **MIXED feeding** her baby, she is **excited** from the study and the advantages of exclusive breastfeeding and dangers of mixed feeding an infant <6 months must be discussed.
Complete sections A, B and C

Section A:

Is mom MIV geinfecteer?	**Ja**	**Nee**

If **ja**, discuss points 1- 7 in section B. If **nee**, discuss points 2- 7 in section B

Section B:	✓ **if done**
Gemengdevoeding (borsmelk wat saam met formule melk gegee word voor 6 maande) verhoog jou baba se risiko met 3-4 keer om met die MIV virus besmette word.	
Gemengde voeding veroorsaak minder borsmelk inname en dus verlaagde melk produksie, dit veroorsaak dan ‘n persepsie van nie genoeg melk nie.	
Eksklusiewe borsvoeding verminder jou kind se kanse om te sterf van diarree en long ontsteking.	
Eksklusiewe borsvoeding verminder jou kindse kanse op allergieë.	
Eksklusiewe borsvoeding kan jou kindse risiko vir hartsiektes, beroerte en kanker verlaag later in die lewe.	
Eksklusiewe borsvoeding kan jou kindse risiko vir vetsugtigheid later in die lewe verminder.	
Borsmelk is goedkoop en het geen bykomende toerusting nodig om op te dien of voorteberei nie.	

Section C:

Has mother been counselled about the dangers of mixed feeding/ advantages of exclusive breastfeeding for the first 6 months?	Yes	No
Has the mother been referred to local clinic for additional information?	Yes	No
Which is her local clinic?		
If no, please specify a reason:		
Month exited from study:		

Key: Ja= 1; Nee= 2; N/A= 3

APPENDIX D1: ENGLISH INFORMED CONSENT

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM

TITLE OF THE RESEARCH PROJECT:
The relationship between breastfeeding self-efficacy and the duration of exclusive breastfeeding, with focus on this relationship between HIV infected and HIV uninfected mothers in Coronationville, Gauteng (South Africa).

REFERENCE NUMBER:

S13/10/195

PRINCIPAL INVESTIGATOR:

Abigail Courtenay RD (SA)

ADDRESS:

Rahima Moosa Mother and Child hospital

Cnr Fuel and Oudtshoorn road, Coronationville, Johannesburg, Gauteng.

CONTACT NUMBERS:

081 550 9160 / (011) 470 9270

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or dietician any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the International Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

- *This study will be conducted at the Rahima Moosa Mother and Child hospital in Coronationville, where 410 mothers will be recruited after giving birth at this hospital.*
- *We want to determine if a mother who has high levels of breastfeeding self-efficacy(confidence) will breastfeed more exclusively than a mother with low breastfeeding self-efficacy (confidence).*

- *You will be asked to indicate answers on a questionnaire now, it will tell us more about you, your feelings towards breastfeeding, how much pain you are experiencing, and your HIV status as well as give us a score that indicates your breastfeeding self-efficacy (confidence).*
- *We will ask if we can contact you telephonically on a monthly basis, for up to 6 month after your baby is born to ask you about your breastfeeding.*

Why have you been invited to participate?

- *Every mother admitted to the Rahima Moosa Mother and Child hospital postnatal wards during the allocated time period that the researcher is available for interviews, who meet the inclusion criteria and are willing to take part in the study.*
- *If you meet the following criteria, you will be asked to take part in the study*
  - *You have expressed intent to exclusively breastfeed your infant*
  - *You are 18 years or older*
  - *You gave birth to a full term infant (≥37weeks gestation)*
  - *You are able to understand spoken English, Afrikaans or Zulu*
  - *You are a South African citizen*
  - *You have access to a cellular/ land line telephone*
- *The following mothers will not be included in the study:*
  - *If your infant requires specialised/ long term care (e.g. Neonatal Intensive Care Unit)*
  - *If your infants has a birth defects that is known to affect feeding practices (e.g. cleft palate)*
  - *If you require specialized/ long term care (e.g. Diabetics, Intensive Care Unit)*

What will your responsibilities be?

- *Your responsibilities will be to answer both questionnaires truthfully on the day the researcher/ translator sees you and answer your telephone on the set days and times provided to you once monthly post discharge and answer that set of questions truthfully as well.*

Will you benefit from taking part in this research?

- *The benefits of taking part in this study will be to help us in the future to determine which mothers are at risk of mixed feeding their infants for the first 6 months of life. If we know who these mothers are; we can focus on educating them on the problems associated with mixed feeding.*

Are there any risks involved in taking part in this research?

- *There are no risks involved in taking part in this study.*

If you do not agree to take part, what alternatives do you have?

- *If you do not agree to take part in this study, you will receive the same standard of care that all other patients receive. We will respect your choice not to take part.*

Who will have access to your medical records?

- *Only the researcher (Abigail Courtenay) will have access to your medical records (including HIV status). This information will be retrieved from your file (and confirmed during the interview) and transferred onto a coded form. Each mother will have a unique code that will correspond to her details. This ensures that if anyone else views the study, all participants will remain anonymous.*

What will happen in the unlikely event of some form of injury occurring as a direct result of your taking part in this research study?

- There is no risk of injury occurring in this study as it is questionnaire based.

Will you be paid to take part in this study and are there any costs involved?

- *You will not be paid to take part in the study, but there will also be no costs involved for you if you do take part.*

Is there anything else that you should know or do?

- *You can contact Abigail Courtenay RD (SA) at Tel: **081 550 9160** / (011)470 9270 if you have any further queries or encounter any problems.*
- *You can contact the Health Research Ethics Committee at (021)938 9207 if you have any concerns or complaints that have not been adequately addressed by your researcher.*
- *You will receive a copy of this information and consent form for your own records.*
- *If this study were to be terminated you will be contacted and informed. However we do not foresee any reason for the termination of this study.*

<u>Declaration by participant</u>

By signing below, I (full name and surname)

…….…… agree to take part in a research study entitled:

The relationship between breastfeeding self-efficacy and the duration of exclusive breastfeeding, with focus on this relationship between HIV infected and HIV uninfected mothers in Coronationville, Gauteng (South Africa).

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.

- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at **Rahima Moosa Mother and Child hospital, Coronationville**

On (*date*) ……...…….. 2015

.....
Signature of participant

<u>Declaration by investigator</u>

I **Abigail Courtenay RD (SA)** declare that:

- I explained the information in this document to *(name of participant)*

  ……...……..……

- I encouraged her to ask questions and took adequate time to answer them.
- I am satisfied that she adequately understands all aspects of the research, as discussed above.
- I **did not** use an interpreter. *If an interpreter is used the informed consent will be in the preferred language (Afr/ Zulu) and signed by the interpreter.*

Signed at **Rahima Moosa Mother and Child hospital, Coronationville**

On (*date*) ……...…….. 2015

.....
Signature of investigator

Primary telephone number: _____

Secondary telephone number: _____

Call mom in the: Afternoon Evening Anytime (please circle)

APPENDIX D2: ZULU INFORMED CONSENT

UKUHLANGAYELA NOKWAZISWA (KWELEAFLET) KANYE NE (CONSENT FORM)

ISIHLOKO SENHLOLI (YE PROJECT)

Ubudlelwane phakathi kokunikezela ubisi lwebele noma ukuncelisa ngokukhethekile, siqondise phakathi kwezinto ezimbili umama onesandulela ngculaza nongenaso isandulela ngculaza. Ngokwe Coronationville, Gauteng (eSouth Africa).

INOMBOLO YEREFERENCE: S13/10/195

UTHISHA NHLOKO WEZOBUHLOLI: Abigail Courtenay RD (SA)

IKHELI:

Rahima Moosa Mother and Child hospital

Cnr Fuel and Oudsthoorn road, Coronationville, Johannesburg, Gauteng.

IZINOMBOLO ZOCINGO

081 550 9160 / 011 470 9270

Uyamenywa ukuba ubambe iqhoza ekuhloleni i(project).

Ngicela uthathe iskhati ufunde imigomo nezinhlelo ezivezwe lapha. Ezichaza kabanzi ngale(project). Uyacelwa ukuba ubuze imibuzo kulenhlangano mayelana nohlelo lokunciphisa umzimba noma ngabe yimuphi umubuzo mayelana nohlelo oluthile lwe (project) ongazwisisi kahle noma ongayiqondisisi kahle. Kubalulekile ukuthi ugculiseke ngokugcwele futhi ugonde mayelana nokuhlolisisa kahle. Futhi ungabandakanyeka kanjani. Ukuhlanganyela kwakho kuzoheha ukuba uzibandakanye kulolihlelo noma kuzokwenza ukuba ukhululeke ukungavumi ukubuthelana nabo. Uma ungavumi ukubuthelana nabo. Lokho ngeke kukuhlukumeze kabi noma ngandlelathize. Uvumelekile ukuthi uyeke ukufunda noma sewuqalile. Nanoma ufuna ukwenza inxenye ethile yakhona.

Loluhlelo lokufunda luhloliwe ngabezempilo ababizwa ngokuthi **Health Research Ethics Committee at Stellenbosch University** yase **Stellenbosch University** futhi luqondiswe maqondana nezinqubo mgomo kanye nemithetho yale **International declaration of Helsinki, South African guidelines for good clinical practice and Medical Research Council (MRC) ethical guidelines for research.**

Kumayelana nani ukuhlolisisa kokufunda

- Lokufunda kuzobe kuqondiswe e**Rahima Moosa and child hospital in Coronationville** lapho omama bezingane abangu 410 bazoqashwa emva kokuba babelethe izingane kulomtholampilo.
- Sifuna ukuba umama osezingeni eliphezulu lokucelisa nokuzithemba. Uzoncelisa ngokugculisayo ngaphezu kukamama onobisi oluncane futhi ongazethembi.
- Uzobuzwa imibuzo manje kulemibuzo. Okokuqala uzositshela kabanzi ngawe, Nangemizwa yakho uma uncelisa, Nanokuthi zingakanani izinhlungu ozizwayo uma ucelisa, futhi uzizwa ukhathala
  kangakanani. Imiphumela yakho ngesandulela ngculazi izosikhombisa ukuzethemba kwakho ekunceliseni.

- Sizokubuza ukuthi singakufonela njalo ngenyanga. Ngaphambi kwezinyanga eziyisithupha ingane izelwe uzophendula imibuzo ngokuncelisa.

Umenywelweni ukuba ube khona

- Wonke umuntu uvumelekile e**Rahima Moosa and child postnatal wards** njalo ngesikhathi esinqhunyiweyo umhloli ekhona ukuzobuza imibuzo ngezimo ezahlukene zoke wadibana nazo uyafisa ukuba ube khona kulokukufundisa.

Uma uhlangana naloluhlelo olukhethekile

- Uma uhlangana nalokhu okulandelayo, uzocela ube khona uma kufundiswa.
- Kufanele ukhombise ukubaluleka kokuncelisa wena ngokwakho.
- Uneminyaka engu 18 noma ngaphezulu.
- Uzothola umtwana ngesikhati esifanele ≥37 wamaviki.
- Uyakuqondisisa ukukhuluma ulwimi lwesingisi, olwesibhunu kanye nolwesizulu.
- Ungowokuzalwa lapha eSouth Afrika.
- Uyakhona ukusebenzisa icingo noma iselula.

Abomama abalandelayo abangeni kulezizifundo.

- Uma ngabe umtwana edinga isikhathi eside nesikhethekileyo isibonelo (**Neonatal intensive care unit).**
- Uma ngabe umtwana ehlukumeza inzalo yakho yazi kahle kuzolimaza nokupha ingane yakho ukudla isibonelo izindebe zomlomo.
- Uma udinga uhlelo olude olukhethekile isibonelo (**Diabetics, Intensive Care Unit**).

Zingaba yini izidingo zakho

- Uyadingeka ukuba uphendule yonke imibuzo ngeqiniso uma beku buza, nomchazeli wakho achaze kahle. Uphendule nocingo ubeke amalanga nesikhathi onikezwe sona kanye ngenyanga (post discharge) uphendule yonke imibuzo ngeqiniso.

Ulibambile iqhaza ekwenzeni uhlobo

- Ukubamba kwakho iqhaza kwezemfundo kuzosisiza nathi ekuhambeni kwesikhathi ukubona ukuthi yimuphi umama osengqupheni yokuxubanisa ukudla. Ekuqaleni kwezinyanga eziyisithupha empilweni yengane uma singamazi ukuthi ngubani lomama sigazinikela ekumfundiseni mayelana nezinkinga ezikhona uma uxubanisa ukudla ingane isencane.

Kungabe zikhona yini izinto ezimbi ezingavela ekwenzeni loluhlobo

- Cha azikho izinto ezingavela ekwenzeni loluhlobo**.**

Uma ungavumi ukuhlanganyela nabo yimaphi ama (alternatives) onawo

- Uma ungavumi ukuhlanganyela nathi kulokukufundiswa ozothola ukunakekelwa okufanayo nalaba abanye. Siyakuhlonipha ukukhetha kwakho ozobe ukukhethile ukungavumi ukuhlanganyela nathi.

Ngubani ongenelela ekuhloleni ehlolweni kwakho kwezempilo

- Kuphela umhloli **Abigail Courtenay** sinayo indlela yokungenelela ohlelweni lwakho lwezempilo malungana nohlelo lwakho lwezempilo lolulwazi luzovela noma lulotshwe kwifayela lakho. Imvume ngesikhathi bekuhlolisisa futhi luyiswe kwi coded form. Wonke umama unenombolo yakhe ehlukile ehambelana nezinto zakhe. Lokhu kuqinisekiswa uma kuvezwa izifundo zakhe. Bonke ababekhona ngeke bavezwe ukuba baziwe.

Kwenzekani emcimbini ongasiwo mnandi uma ngabe ukulimala kwenzeka nqco kuwe

- Akuhko okungakubeka engcupheni yokulimala kulezizifundo njengoba imbuzo ibekiwe kuzo.

Uzokhokha imali ethile uma uzoba khona kulezizifundo kungabe kukhona ezinye izindleko ezikhona

- Akunamali ozoyikhipha uma ube khona uma ngabe khona kulezizifundo.

Kukhona yini okunye okuseceleni okumele ukwazi noma ukwenze

- Ungaxhumana no **Abigail Courtenay RD ku 081 550 9160 / (011) 470 9270** uneminye imibuzo noma unezinye izinkinga ondlule kuzo.
- Ungaxhumana ne Health Research Ethics ku (012) 938 9207 uma ngabe unomunye umqondo noma imibuzo leyo engabuzwanga nengachazwanga kahle yilaba abahlolayo.
- Uzothola ikhopi yaleyondaba kanye nelinye ifomu elilotshiwe ngawe / noma elizobhalwa ngawe
- Uma lezizifundo zingajutshwanga sizokwazisa ngocingo nanoma singaboni isizathu sokuba uyekele ukufunda.

<u>Obekakhona angasayina ngenzansi (Participant's declaration)</u>

Ngokusayina ngezansi ngingu (igama nesibongo)

……..……ngiyavuma ukuba khona ekuhlolweni kwezemfundo.

Ubudlelwane phakathi kokuncelisa wena ngokwakho kanye nesikhathi sakho esikhethekile sokuncelisa. Maqondana nobudlelwane phakathi kukamama onegciwane nomama ongenalo ugciwane. Kwi Coronationville Gauteng (eSouth Africa).

Ngiyagcizelela ukuba

- Ngike ngafunda noma ngake ngafunda ngalolulwazi nefolomu lecoset dubhalwe ngolwimi egilwazi kahle.
- Nginalo ithuba lokubuza imibuzo futhi yonke imibuzo iphendulwe kahle
- Ngiyaqonda ukuthi ukuba khona kwami ngokuzinikela kulezizifundo ngizobe ngingaphushwanga ukba ngibe khona.
- Ngiyazikhethela ukuyeka ukufunda noma ngabe yinini akekho ozongijezisa noma (prejudice).
- Kungenzeka ukuba ucelwe ukuba uyeke ukufunda ngaphambi kokuba uqede. Uma udokotela wezenfudo noma umhloli ezwa ukuba ufuna ukungenelela kulokhu kuzinikela kwami, uma ngingalandeli umgomo wezokufunda obekiwe. Njengokuvunyelwene.

Kusayinwe e**Rahima Moosa Mother and Child Hospital, Coronationville**

Ngalolusuku ……..…….. 2014

.....

Ukusayina obekakhona (Participant)

Umpenyi angasayina ngezansi (Investigator's declaration)

Ngingu Abigail Courtenay RD (SA) ngiyaqiniseka ukuba

……

- Ngichaze konke okwenzekile kulencwadi nasegameni lababekhona
- Ngiyanikwa isikhathi esanele sokubuza imbuzo futhi ngiyanikwa isikhathi esanele sokuphendula imibuzo.
- Nginelisekile ukuba uthathe isikhathi sakhe esanele sokuphendula imibuzo futhi azi yonke imibandela yaloluphenyo oluxoxwe ngenhla.
- Azange ngimsebenzise umuntu ozochaza (uma umchazi asebenzise umuntu ozochaza akufanele agcizelele ngenzansi).

Isayinwe e**Rahima Moosa and Child hospital, Coronationville**

Ngalolusuku ……...…….. 2014

.....
Signature of investigator

Isiqiniseko somchazi (Interpreter's declaration)

Ngingu**,** …… ngichaza ukuthi:

- Ngilekelelwe umfunindaba **Abigail Courtenay RD (SA)** kuba achaze lonke ulwazi ngalencwadi (igama lobekakhona)
  …… ngokusebenzisa ulwimi lwesizulu.

- ✓ Siyaqguqguzela kuba abuze imibuzo futhi athathe isikhathi sakhe aphendule imibuzo.
- ✓ Ngikhuluma ngokwazi ukuba kuyiqiniso maqondana nami.
- ✓ Ngiyaqiniseka ukuba ababekhona bayayazi yonke indaba eshiwo kuleliphepha futhi nawe uyibuzile imibuzo wayithola impendulo wanelisekile.

Isayinwe e**Rahima Moosa Mother and child hospital, Coronationville.**

Usuku ……...…….. 2014

.....
Obekakhona (Interpreter)

Primary telephone number: _____

Secondary telephone number: _____

Call mom in the: -Afternoon -Evening Anytime (please circle)

APPENDIX D3: AFRIKAANS INFORMED CONSENT

DEELNEMER INLIGTINGSTUK EN TOESTEMMINGSVORM

TITEL VAN DIE NAVORSINGS PROJEK:
Die verhouding tussen borsvoeding self-doeltreffendheid en die duur van ekslusiewe borsvoeding, met die fokus op die verhouding tussen MIV geinfekteerde en MIV ongeïnfekteerde moeders in Coronationville, Gauteng (Suid-Afrika).

VERWYSINGSNOMMER:
S13/ 10/ 195

HOOFNAVORSER:
Abigail Courtenay RD (SA)

ADRES:
Rahima Moosa Mother and Child Hospital
Hoek van Fuel en Oudtshoorn straat, Coronationville, Johannesburg, Gauteng.

KONTAKNOMMERS:
081 550 9160 / (011) 470 9270

Jy word uitgenooi om deel te neem in 'n navorsings projek. Neem asseblief die tyd om die inligting te lees wat hier aangebied word, wat die besonderhede van die projek sal verduidelik. Vra asseblief die studie personeel of dieetkundige enige vrae oor enige deel van hierdie projek wat jy nie ten volle verstaan nie. Dit is baie belangrik dat jy ten volle tevrede is en dat jy duidelik verstaan wat hierdie navorsing behels en hoe jy betrokke kan wees. Ook, jou deelname is **vrywillig** en jy mag sê as jy nie wil deel neem nie. As jy nee sê, sal dit geen invloed op jou behandeling hê nie. Jy is ook vry om ten enige tyd te onttrek van die studie, selfs as jy al klaar gesê dat jy sal deelneem.
Hierdie studie is deur die **Gesondheid Navorsings etiek komitee aan die Universiteit van Stellenbosch** goedgekeur en sal uitgevoer word volgens die etiese riglyne en beginsels van die Internationale Deklarasie van Helsinki; Suid-Afrikaanse riglyne vir goeie kliniese praktyk en die Mediese Navorsingsraad (MRC) etiese riglyne vir navorsing.

Waaroor gaan die navorsing?

- *Hierdie studie sal gedoen word by die Rahima Moosa Mother and Child Hospital in Coronationville, waar 410 moeders gewerf sal word na geboorte by die hospitaal.*
- *Ons wil uitfind of 'n moeder wat hoë vlakke van borsvoeding self-doeltreffendheid (self vertroue) het meer eksklusief borsvoed as 'n ma met 'n lae borsvoeding self-doeltreffendheid (self vertroue).*
- *Jy sal gevra word om antwoorde in 'n vraelys aan te dui. Dit sal vir ons meer vertel oor jou, jou gevoelens teen borsvoeding, hoeveel pyn jy ervaar, hoe moeg jy voelen jou MIV-status. Dit sal ook vir ons 'n telling gee wat dui op jou borsvoeding self-doeltreffendheid (self vertroue).*
- *Ons sal vra of ons jou telefonies kan kontak op 'n maandelikse basis, vir tot 6 maande nadat jou baba gebore is om navraag te doen oor jou borsvoeding.*

Hoekom is jy uitgenooi om deel te neem?

- *Elke moerder wat by die Rahima Moosa Mother and Child Hospital nageboorte sale tydens die toegekende tyd opgeneem is en waar die navorser beskikbaar is vir onderhoude; die wie aan die insluitende kriteria voldoen; endie wat bereid is om deel te neem aan die studie word uitgenooi om deel te neem.*

- *As jy aan die volgende kriteria voldoen, sal jy uitgenooi word om deel te neem in die studie:*
  - *Jy het voorneme om uitsluitlik jou baba te borsvoed uitgespreek*
  - *Jy is 18 jaar of ouer*
  - *Jy het geboorte gegee aan 'n volle termyn baba (≥ 37weeks swangerskap)*
  - *Jy is in staat om gesproke Engels, Afrikaans of Zulu te verstaan*
  - *Jy is 'n Suid-Afrikaanse burger*
  - *Jy het toegang tot 'n sellulêre/ land-lyn telefoon*

- *Die volgende moeders sal nie ingesluit word in die studie:*
  - *As jou baba gespesialiseerde / langtermyn sorg vereis (bv. Neonatal Intensiewe Versorg)*
  - *As jou baba 'n geboorte defek het wat bekende voedings praktyke beïnvloed (bv. gesplete verhemelte)*
  - *As jy gespesialiseerde/ langtermyn sorg nodig het (bv. As jy 'n Diabeet is of Intensiewe Versorging benodig)*

Wat sal jou verantwoordelikhede wees?

- *Jy sal verantwoordelik wees omdie vraelys eerlik op die dag wanneer die navorser/ vertaler jou sien, te beantwoorden op die gestelde dae en tye maandeliks na ontslag van die hospitaal telefonies ook daardie stel vrae eerlik te beantwoord.*

Watter voordeel is daar vir jou as jy in hierdie navorsing deelneem?

- *Die voordeel vir die deelneemersin hierdie studie is om ons te help om in die toekoms te bepaal watter moeders die risiko staan om hul babas met gemengde voeding te voed gedurende die eerste 6 maande van hul lewe. As ons weet wie hierdie moeders is; kan ons fokus op hulle opvoeding oor die probleme wat met gemengde voeding gepaart gaan.*

Is daar einige risiko's betrokke vir jou deelname in hierdie navorsing?

- *Daar is geen risiko's betrokke vir jou deelname in hierdie studie nie.*

Indien jy nie instem om deelteneem nie, watter alternatief het jy?

- Indien jy nie instem om deelteneem aan hierdie studie nie, sal jy nogsteeds die selfde standaard sorg ontvang, soos alle ander pasiënte Ons respekteer jou keuse om nie deel te neem nie.

Wie sal toegang hê tot jou mediese rekords?

- *Slegs die navorser (Abigail Courtenay) sal toegang tot jou mediese rekords (insluitend MIV-status) hê. Hierdie inligting sal ingewin word vanuit jou lêer (en tydens die onderhoud*

bevestig word) en oorgedra word op 'n gekodeerde vorm.Elke ma sal 'n unieke kode wat ooreenstem met haar besonderhede. Dit verseker dat as enige iemand anders die studie beskou; alle deelnemers anoniem sal bly.

Wat sal gebeur in die onwaarskynlike geval waar 'n vorm van besering voorkom as 'n direkte gevolg van jou deelname aan hierdie navorsing?

- *Daar is geen risiko van besering wat met hierdie studie gepaard gaan; aangesien hierdie slegs op 'n vraelys gebaseer is.*

Sal jy betaal word om aan hierdie studie deel te neem of is daar enige koste aan verbonde?

- *Jy sal nie betaal word om deel te neem nie; maar daar is ook geen koste betrokke vir jou deelname nie.*

Is daar enige iets anders wat jy moet weet of doen?

- *Jy kan Abigail Courtenay RD(SA) by* 081 550 9160 */ (011) 470 9270 kontak indien jy enige verder navrae het, of enige probleme ondervind.*
- *Jy kan die Gesondheid Navorsingsetiekkommitee by (021) 938 9207 kontak indien jy enige probleme of klagtes het wat nie aangespreek is deur jou navorser nie.*
- *Jy sal 'n kopie van hierdie inligting en toestemming vorm ontvang vir u eie rekords.*
- *As hierdie studie getermineer word sal ons jou kontak en inlig. Maar ons voorsien geen rede vir terminasie van hierdie studie nie.*

<u>Verklaring deur deelnemer</u>

Deur die ondertekening, Ek (volle naam en van)

…….……..…… stem ek saam om deel te neem aan 'n navorsingstudie getiteld:

Die verhouding tussen borsvoeding self-doeltreffendheid en die duur van 'n eksklusiewe borsvoeding, met die fokus op die verhouding tussen MIV-besmette en onbesmette MIV moeders in Coronationville, Gauteng (Suid-Afrika).

Ek verklaar dat:

- Ek het hierdie inligting en toestemming vorm gelees of dit is vir my gelees in 'n taal wat ek vlot en gemaklik verstaan.
- Ek het 'n kans gekry om vrae te vra en al my vrae was bevredigend beantwoord.
- Ek verstaan dat deelname aan hierdie studie **vrywillig** is en ek is nie onder druk geplaas om deel te neem nie.
- Ek kan kies om terenige tyd van die studie te ontrek en ek sal op geen manier benadeel word nie.
- Ek kan gevra word om die studie te verlaat voor die einde van die studie, indien die studiedokter of navorser voel dat dit in my beste belang is, of as ek nie die studie plan volg soos ooreengekom nie.

Geteken te**Rahima Moosa Mother and Child Hospital, Coronationville**
Op (*datum)*.....2014

……..

Ondertekening van 'n deelnemer

Verklaring deur navorser

Ek **Abigail Courtenay RD (SA)** verklaar dat:

- Ek het die inligting in hierdie dokument aan *(naam van deelnemer) verduidelik*

……..…….....……

- Ek het haar aangemoedig om vrae te vra en het voldoende tyd spandeerom hulle te beantwoord.
- Ek is tevrede dat sy alle aspekte van die navorsing genoegsaam verstaan, soos hierbo bespreek.
- Ek het/ het nie 'n tolk gebruik. *(Indien'n tolk gebruik het dan moet die tolk die onderstaande verklaring teken.)*

Geteken te **Rahima Moosa Mother and Child Hospital, Coronationville**
Op (*datum)* 2014

……..
Handtekening van ondersoeker

Verklaring deur die tolk:

Ek, *(*volle naam en van*)*……..…….....……verklaar dat:

- Ek het die ondersoeker, **Abigail Courtenay RD (SA),** bygestaan het om die inligting in hierdie dokument vir *(naam van deelnemer)*:……..te verduidelik in Afrikaans.
- Ons het haar aangemoedig om vrae te vra en het voldoende tyd spandeerom hulle te beantwoord.
- Ek het ‘n feitelik korrekte vertaling oorgedra van die inligting wat aan my verskaf is.
- Ek is oortuig dat die deelnemer die volle inhoud van hierdie deelnemer inligtingstuk en toestemmings vorm ten volle verstaan en dat al haar vrae beverdigend beantwoord is.

Geteken te **Rahima Moosa Mother and Child Hospital, Coronationville**
Op (*datum)* 2014

……..
Handtekening van tolk

Primary telephone number: _____

Secondary telephone number: _____

Call mom in the: -Morning -Afternoon -Evening Anytime (please circle)

ADDENDUM E: CONFIDENCE LEVELS VISUAL AID.

CONFIDENCE LEVELS (BSES-SF Study)

1. Not confident at all/ Not sure of myself at all
2. Not very confident/ Not very sure of myself
3. Somewhat confident/ Somewhat sure of myself
4. Confident/ Sure of myself
5. Very confident/ Very sure of myself